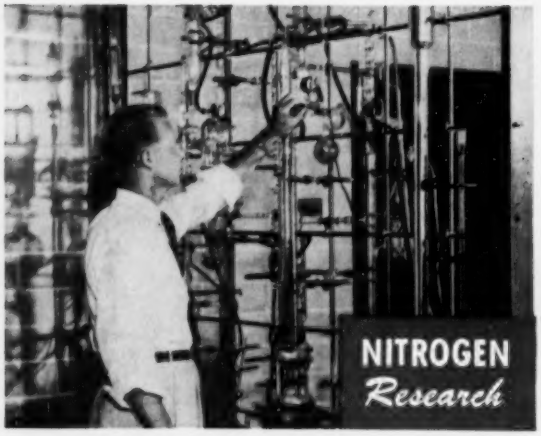
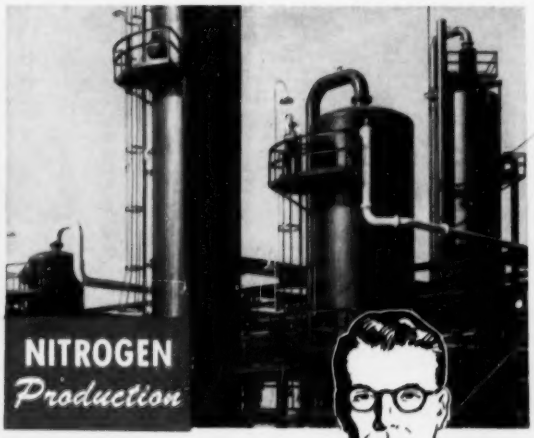
JUNE, 1956

Commercial Fertilizer

and PLANT FOOD INDUSTRY





Technical help for you

Top-notch technical service on ammoniation and other fertilizer production problems is always as close by as your telephone. The skills and knowledge gained in 26 years of nitrogen solutions testing and production are always available to you from the nearby Nitrogen Division technical service representative. Nitrogen Division, originator of nitrogen solutions, continues to pioneer new and better solutions and other nitrogen materials to help you produce better-conditioned fertilizers at low cost.

Three big Nitrogen Division plants, plus the modern Nitrogen Division research laboratory at Hopewell, Virginia are working to provide better nitrogen products for you. See the man who can help you get greater benefits from this accumulated knowledge and skill. For details on solutions that can help solve your problems in building better fertilizers for bigger profits, write or call the nearest address below—and ask for Nitrogen Division technical service. There's no charge to customers.

*Trade-mark

Arcadian®

NITROGEN SOLUTIONS:
NITRANA® • URANA® • U-A-S*

OTHER NITROGEN PRODUCTS: **Anhydrous Ammonia**
Urea Products • A-N-L® • Sulphate of Ammonia

NITROGEN DIVISION Allied Chemical & Dye Corporation
New York 6, N. Y. • Indianapolis 20, Ind. • Omaha 7, Neb. • Ironton, Ohio
Atlanta 3, Ga. • Hopewell, Va. • San Francisco 4, Cal.

NITROGEN DIVISION ALLIED CHEMICAL

With The *Kraftpacker*

Kraft Bag Corporation

hands you bag filling perfection on a silver tray!

ACCURACY

The Kraftpacker guarantees an 8 oz. plus or minus tolerance—but actually delivers a daily average closer to 4 oz.!

HIGH PRODUCTION

Plants with Kraftpacker installations report filling 18 to 22 80 or 100 lb. charges a minute, with one man hanging bags—and a daily average of 40 tons per hour, with 10 to 12 change-overs.

SIMPLICITY

No automatic open mouth bag filling machine of its type will handle free-flowing material easier than The Kraftpacker. Reduces packaging costs at an unbelievable rate.

ECONOMY

The Kraftpacker is a proved money-saver in every way—costs less to buy, less to install, less to maintain.

and . . .

with Kraft Bag Corporation's integrated 2-plant multiwall bag manufacturing facilities, you have *everything* you need for your packaging operation, from one dependable source!

Ask for representative . . . or brochure

KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary

630 Fifth Ave., New York 20, N. Y.

Western Sales Office: Daily News Bldg., Chicago 6, Ill.

SALESMEN... to help boost YOUR profits!

Boost the Cost-Price Squeeze!
each $1 properly invested in
LION AMMONIUM NITRATE
will return $3 to $6 on the average corn crop
Extra profits for you are
MIXED FERTILIZER
LION OIL COMPANY

LION Advertisements Sell LION Nitrogen, *and Your Mixed Goods, Too!*

Continuous Lion advertising appears in leading farm publications, month-after-month, to pre-sell the Lion brand to farmers—and to sell the value of *your mixed fertilizers as well!*

Current advertisements are appearing in Farm and Ranch-Southern Agriculturist, Progressive Farmer, The Farmer, Nebraska Farmer, Kansas Farmer, Prairie Farmer, Wallace's Farmer & Iowa Homestead, Wisconsin Agriculturist and Farmer, Missouri Ruralist and Missouri Farmer. All of these advertisements are in color.

Each Lion advertisement promotes the economic benefits of properly using fertilizers, including Lion Ammonium Nitrate, to help increase the farmer's profits. Each advertisement sells *hard* on the importance of soil tests in the intelligent use of all commercial fertilizers. Lion, a leader in nitrogen production, leads the way to good fertilization practices . . . to better profits for you!

LION'S QUALITY LINE OF NITROGEN FERTILIZER MATERIALS

LION ANHYDROUS AMMONIA—82.2% nitrogen. Quality guaranteed.
LION AQUA AMMONIA—Ammonia content above 30%—other grades to suit your requirements.
LION AMMONIUM NITRATE FERTILIZER—Improved spherical pellets. Guaranteed 33.5% nitrogen.
LION NITROGEN FERTILIZER SOLUTIONS—Various types to suit your particular manufacturing needs.
LION SULPHATE OF AMMONIA—White, uniform, free-flowing crystals. Guaranteed 21% nitrogen.

LION OIL COMPANY

A DIVISION OF MONSANTO CHEMICAL COMPANY

EL DORADO, ARKANSAS

DISTRICT SALES OFFICES: Lion Oil Building, El Dorado, Ark. • Insurance Exchange Building, Des Moines, Ia. National Bank of Commerce Building, New Orleans, La. • 1401 Building, Atlanta, Ga.

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Vol. 92 No. 6 *Established* 1910 June, 1956

Commercial Fertilizer
and PLANT FOOD INDUSTRY

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Commenting Freely

by Bruce Moran

A high school in Utah is about to embark on an experiment which should be watched with real interest by our industry. The State director of vocational agriculture has won approval for the testing of a course in what he calls "agribusanics." This means he wants to train the increasingly large group of boys who wish to enter farm-related business and industrial fields, such as fertilizer and farm implements.

The thing that strikes me about this, in addition to the good sense it makes fundamentally, is the fact that it is an "increasingly large" group of boys who want to get into the field. It is a far cry from the days when the song asked "How you gonna keep 'em down on the farm. . .?" And a far cry from the present gloom in some circles as farm income falls below the record peaks of a few years back, under the influence of overhanging surpluses.

It looks as though these kids were aware that our growing nation demands preparation for the future, when the "fifth plate" must be laid on the table, to feed the newcomers who are expected in our midst a few years from now . . . and that the farmer will need more mechanization as well as more fertilizer as time goes on.

Evidently the younger generation can see beyond their noses!

TIME TO GET SET

with

WEATHERLY CONTROLLED GRANULATION

for the

1956-57 SEASON!

Full operation in widely scattered plants has demonstrated that Weatherly Granulated mixed goods sell better because of close sizing and uniform analysis. So the Weatherly Process has become the standard of the industry—the most talked about and the most completely accepted method in the field.

Weatherly equipment is rugged, heavy duty. From the lowest cost materials it turns out a high volume of high quality goods — sized to pass through 6 mesh and be retained on 16 mesh screen.

So Weatherly installations are producing more quality tonnage, plant for plant, than any other . . . a fact you can see for yourself, if you like, in plants near you. Talk to owners of Weatherly converted plants yourself, and then let us get your plant ready for the coming season.

Standard of the Industry!

Weatherly Controlled Granulation **20–60 tons per hour**

The D. M. WEATHERLY COMPANY

Industrial Engineers and Builders

830 Ponce de Leon Ave., N. E., Atlanta, Georgia **Phone: TRinity 5-7986**

In just one year...

over ¼ million tons have switched

Round-the-clock production at Bonnie takes the push out of peak-season demands. Mammoth off-season storage capacity swallows up the seven-day-a-week production, stores it safely until you need it. And the industry's finest delivery schedules assure you high-quality triple when you need it.

International's natural curing helps you cut costs

• It's the natural curing process that gives you that "something-extra" quality of the triple super from Bonnie.

It helps you cut costs . . . gives you better control of manufacturing conditions and chemical reactions . . . stabilizes your formulation problems . . . and reduces the delivered unit cost of (P_2O_5). Here's what natural curing means to you:

Uniform particle size . . . for dependable ammoniation results.

Finer texture . . . for more complete ammoniation in every batch.

Stabilized product . . . for better chemical control.

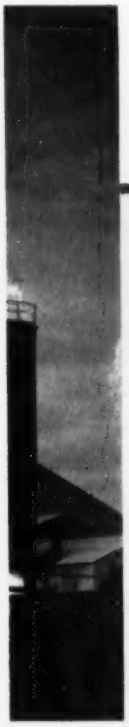
Constant high analysis . . . with guaranteed minimum of 46% A.P.A.

Uniform high quality . . . for increased (P_2O_5) availability.

To guarantee this top quality triple from a plant as large as Bonnie required extra planning in plant design . . . extra capacity for a dependable supply . . . extra time to complete the five-week natural curing process . . . and extra care and quality control to assure uniform results in batch after batch.

This is the way Bonnie was built. And the results of the past year have proved Bonnie can deliver . . . Bonnie is dependable . . . and Bonnie can produce the kind of triple you want.

# of Triple Super Sales to Bonnie



The reason: | *trustworthy service and delivery plus superior results with International's natural-cured triple*

Yes, in a single year, International has zoomed to a top position as a supplier in the triple super industry. Here's why, in the actual words of Bonnie customers:*

Others have recommended you

"Several nitrogen producers have recommended your product to us because of its excellent ammoniation. They were right."

Missouri

You live up to delivery promises

"What we like about doing business with International is your service, particularly regarding delivery. Our material has always been shipped when requested."

Indiana

Your triple stores better

"Last September, we stored some of your triple next to competitive materials from two other suppliers. Six months later, the other two piles were set up hard enough to be blasted. Any lumps in your product could be broken with your fingers."

Minnesota

Your triple is a better product

"This is the best triple we have ever used for ammoniation."

Ontario

We get better ammoniation results

"We can put 600 lbs. of Urana 10 in with 1,400 lbs. of triple."

New York

Your Triple holds more nitrogen

"We have been amazed with the results. With a very high humidity we have been using 500 lbs. of nitrogen solution with 1,400 lbs. of your triple. Never before have we been able to get over 360 lbs. of this solution in the mix."

Maine

We save money with your triple

"We like the constant high analysis of your product. It aids us in formulation and reduces the unit delivered cost."

North Dakota

You meet delivery schedules

"We certainly appreciate the way International came through on schedule during the rush season."

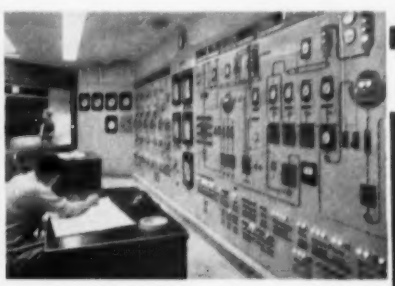
Arkansas

**names on request*

These are just a few of the reasons why this year, the big switch in triple super sales is to Bonnie — giant production facilities . . . prompt delivery . . . superior quality . . . and outstanding ammoniation results.

So this year, for a better product, and service you can depend upon, look to International Minerals & Chemical Corporation. You'll be glad you did.

This 85,000-ton curing unit — as big as two, full-sized football fields — is one example of the time and big capacity needed to produce natural-cured triple.



These "doodads" and dials get results . . . guard the uniformity and quality of every batch of triple super from Bonnie . . . help assure you of top results in ammoniation.

MINERALS International CHEMICALS

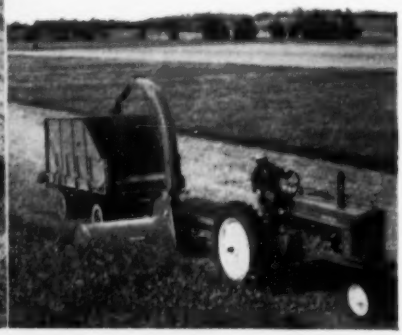
INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Phosphate Chemicals Division • General Offices: 20 North Wacker Drive, Chicago 6

TO MANUFACTURERS AND DISTRIBUTORS OF FERTILIZERS

This advertisement, appearing in farm publications in Florida, Delaware, Maryland, New Jersey and Washington State, tells farmers, planters and fruit growers what Moly in fertilizer can do in combating soil deficiencies and improving yields. Several firms are already adding Moly to their blends. Write Dept. 43, Climax Molybdenum Company, for more facts about the extra value to your customers and extra profit to you which can result from the addition of MOLY to your fertilizer blends.

In experimental farm studies conducted in Washington State, the yield of alfalfa was increased nearly 40% by adding Moly to molybdenum-deficient soil. The fodder below the white line in the stack at the left indicates yield on moly-deficient soil. Volume above the line indicates increase produced by addition of Moly to soil. Photos courtesy of John Deere, Moline, Illinois.



How alfalfa yield has been stepped up nearly 40% by adding MOLYBDENUM to some acid Washington soils

Application of Sodium Molybdate to Moly-deficient soil, tests show, will result in sizeable yield increases

Scientific tests conducted by Dr. H. M. Reisenauer in Spokane County, Washington, have resulted in greatly increased yields of alfalfa. Investigations that began in 1952 have shown that poor forage yields were caused by Moly deficiency. Correction was made by adding one pound of sodium molybdate per acre. The applications were made in water solution, using a weed spraying outfit.

Other marked advantages result from the use of Moly

When alfalfa is grown in a Moly-deficient soil the plants tend to be stunted and pale green in color. Spots develop between the leaf veins, often spreading to affect the entire leaf. Such leaves finally die and fall off. When other conditions are favorable, these deficiency symptoms are corrected by the addition of available Moly to the soil, resulting in greater yields and more vigorous growth.

Tests here and abroad show that all crops need Moly

Thorough tests, made over the last 15 years, both in this country and in many foreign areas, have shown conclusively that all crops need Moly in a form which can be assimilated readily by the plant. If available Moly is not present in the soil in sufficient quantities, then it should be added either alone or combined with fertilizers.

Now is the time to find out whether your own soil is deficient in Moly

Specific experiments with dozens of different crops, ranging from citrus to sugar beets, proved that Moly deficiency exists in soils in many areas in the United States. If your own soil lacks available Moly you may be getting much lower yields than you should. Get in touch with your County Agent. He will be glad to help you set up test plots. Write for our bulletin: "Testing for Molybdenum Deficiency." Address Dept. 57, Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.

MOLY CAN BE ADDED TO ANY FERTILIZER BLEND

When ordering fertilizer you can always specify that molybdenum be included as an additive.

CLIMAX MOLYBDENUM

NOW ON STREAM!

Escambia Bay Chemical Corporation, Pensacola, Florida — the only plant of its type on the Gulf Coast, east of New Orleans!

NOW PRODUCING A CONTINUOUS SUPPLY OF ANHYDROUS AMMONIA, NITRIC ACID, BAY-SOL NITROGEN SOLUTIONS, AND—

AMMO-NITE

AMMONIUM NITRATE FERTILIZER

Containing 33.5% Nitrogen

Sell AMMO-NITE . . . and you can offer your customers *more* Nitrogen for *less* money than other plant food forms. Simple arithmetic proves it! More Nitrogen in every bag means less bulk and weight for you and your customers. Uniform AMMO-NITE prills flow freely, spread evenly — never clog or stick in the spreader. AMMO-NITE leaches far less, too! New *stay-dry* bags keep AMMO-NITE in perfect condition in any weather. Order now. *It's a money-maker!*

GROW IT RIGHT WITH AMMO-NITE!

Products of the Escambia Bay Chemical Corporation, Pensacola, Florida, are distributed exclusively by

ASHCRAFT-WILKINSON COMPANY, Atlanta, Georgia

JUST AROUND THE CORNER *by Vernon Mount*

MALEFACTORS OF GREAT WEALTH may not be the exact phrase that will be used, but it gives you an idea of what depths the Presidential campaign is likely to plumb. For a Nation that has permitted the greatest concentration of political power in its history, it sounds strange for politicians to be irate over concentrations of economic power.

REVERSAL OF FORM is indicated. Back in the Teddy Roosevelt trust-busting days it was the Republicans who were elected on that basis. Now we have the Democrats almost on the same beam.

OUR READERS WILL REMEMBER we have warned of this tendency to block mergers, despite the obvious economy and public advantages they bring. You will remember also that this department has urged business and industry to organize as labor is organized—for protection against the pendulum swings of politics. This year will make that more obvious than ever. Watch it.

Yours faithfully

Vernon Mount

ARMOUR

THE GREATEST NAME IN FERTILIZER

31 FACTORIES AND OFFICES
CONVENIENTLY LOCATED TO SERVE YOU

Albany, Georgia
Atlanta, Georgia
Augusta, Georgia
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Chicago Heights, Illinois
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Columbia, South Carolina
Columbus, Georgia
Dallas, Texas
East St. Louis, Illinois
Greensboro, North Carolina
Houston, Texas
Jacksonville, Florida
Jeffersonville, Indiana
Memphis, Tennessee
Montgomery, Alabama
Nashville, Tennessee
New Orleans, Louisiana
Norfolk, Virginia
North Kansas City, Missouri
Presque Isle, Maine
Sandusky, Ohio
Siglo, Tennessee
Waterloo, Iowa
Wilmington, North Carolina
Winona, Minnesota

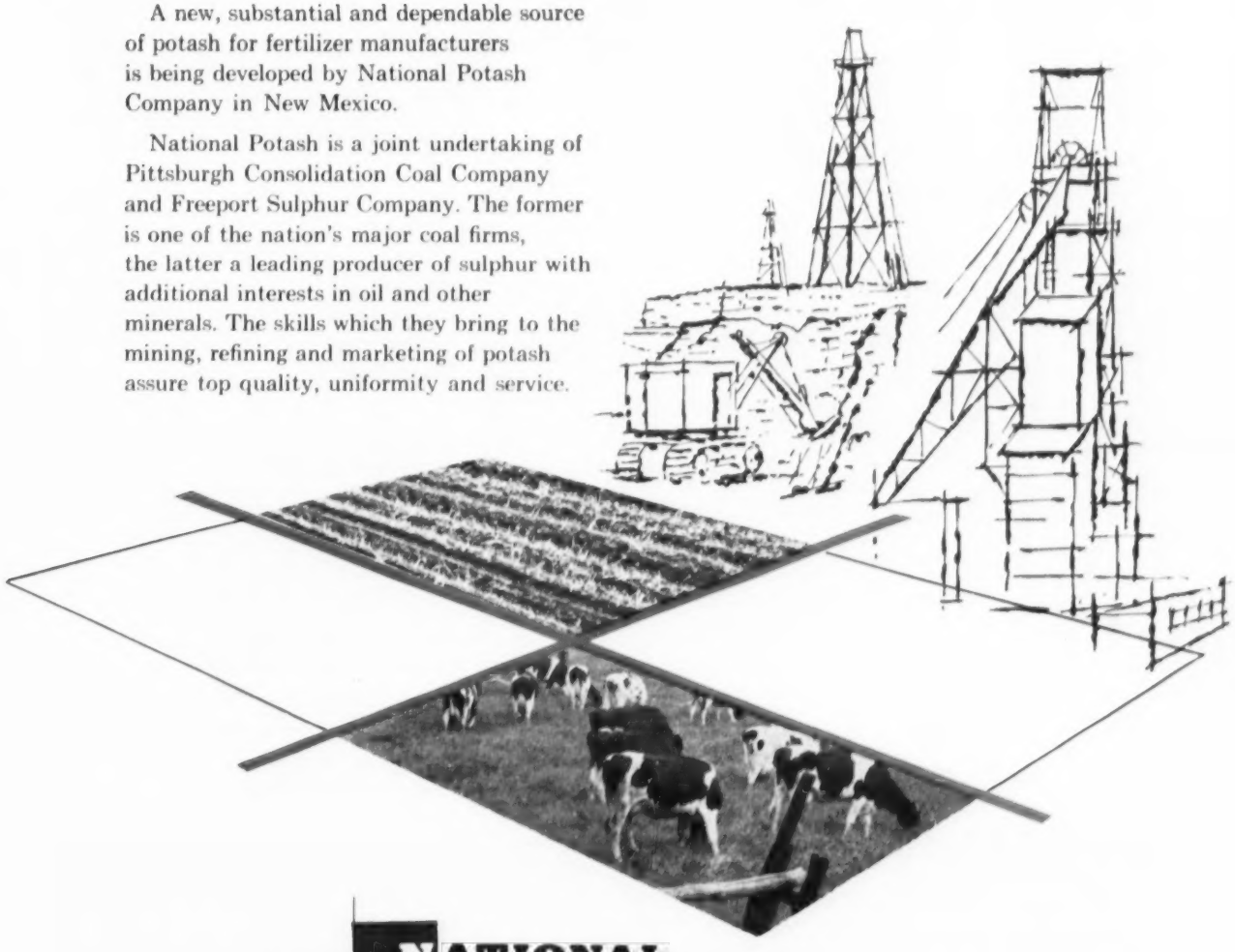
Also sales offices in Havana, Cuba, and San Juan, Puerto Rico

ARMOUR FERTILIZER WORKS
General Office, P. O. Box 1685, Atlanta 1, Georgia

a joint venture in Potash

A new, substantial and dependable source of potash for fertilizer manufacturers is being developed by National Potash Company in New Mexico.

National Potash is a joint undertaking of Pittsburgh Consolidation Coal Company and Freeport Sulphur Company. The former is one of the nation's major coal firms, the latter a leading producer of sulphur with additional interests in oil and other minerals. The skills which they bring to the mining, refining and marketing of potash assure top quality, uniformity and service.



NATIONAL POTASH COMPANY

205 EAST 42nd ST. • NEW YORK 17, N.Y.

with practically no limitations

NOW! You Can Field Mix

Liquid Fertilizers and Pesticides

with the Versatile EMCOLS H-A / H-B *Emulsifiers*

Further advantages of this novel system:

1. Emulsifiable pesticide concentrates are compatible in liquid fertilizers regardless of sources of NPK (Nitrogen, Phosphorus, Potassium).
2. Emulsions are easily formed with minimum agitation.
3. Maximum flexibility is provided for controlling pesticide-fertilizer dosages in mixed crop requirements.
4. Pesticide concentrates are also suitable for conventional aqueous spray applications in case of carry-over stock.

All these advantages make this novel system economically attractive to formulators, applicators and growers.

For further technical information, contact your local Emulsol representative, or write direct to

EMULSOL CHEMICAL CORPORATION
division of the Witco Chemical Company
59 EAST MADISON STREET • CHICAGO 3, ILLINOIS, U.S.A.

LINK-BELT "turn-key" SERVICE

unlocks new efficiencies in fertilizer production

Up goes steel work and Link-Belt equipment for another fertilizer plant handled on a "turn-key" contract. This TVA continuous ammoniator process will utilize anhydrous ammonia and ammonium nitrate solutions.

Under this inclusive 5-point program, LINK-BELT will:

1. **PILOT THE PROCESS,** using our complete laboratory and test facilities.
2. **DESIGN THE SYSTEM** as an efficient, integrated operation conforming to your exact needs.
3. **FABRICATE THE EQUIPMENT.** Link-Belt makes a complete line—will also supply special requirements.
4. **ERECT THE PLANT,** providing crews and supervisory service.
5. **START THE OPERATION,** with field engineers ready to make final adjustments.

FREEDOM from construction detail . . . integrated operation . . . a uniform product—Link-Belt "turn-key" service offers these and more benefits for fertilizer plants. Our specialists stand ready to cooperate with your engineers or consultants to produce a top-grade fertilizer at minimum cost.

Link-Belt experience includes dry-mix, superphosphate, ammonium phosphate, ammonium nitrate, ammonium sulphate, urea, granular and other types of fertilizer. If you're planning a new operation or feel your present system should be modernized, you'll want full details. Write for Book 2459 showing equipment and typical layouts . . . or call your nearest Link-Belt office.

LINK-BELT

PLANTS AND EQUIPMENT FOR THE FERTILIZER INDUSTRY

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.146

MULTIWALL BAG USERS ASSURED FAST SERVICE BY NEW ST. REGIS KANSAS CITY PLANT

Quick delivery to Midwest points

Now, in Kansas City, another plant joins the St. Regis family to supplement the production of our other bag plants throughout the country. This new plant will serve our Midwest customers . . . and is particularly designed to meet the special needs of the feed, flour and fertilizer industries. That means *St. Regis custom service right at your door step* from this strategically located site.

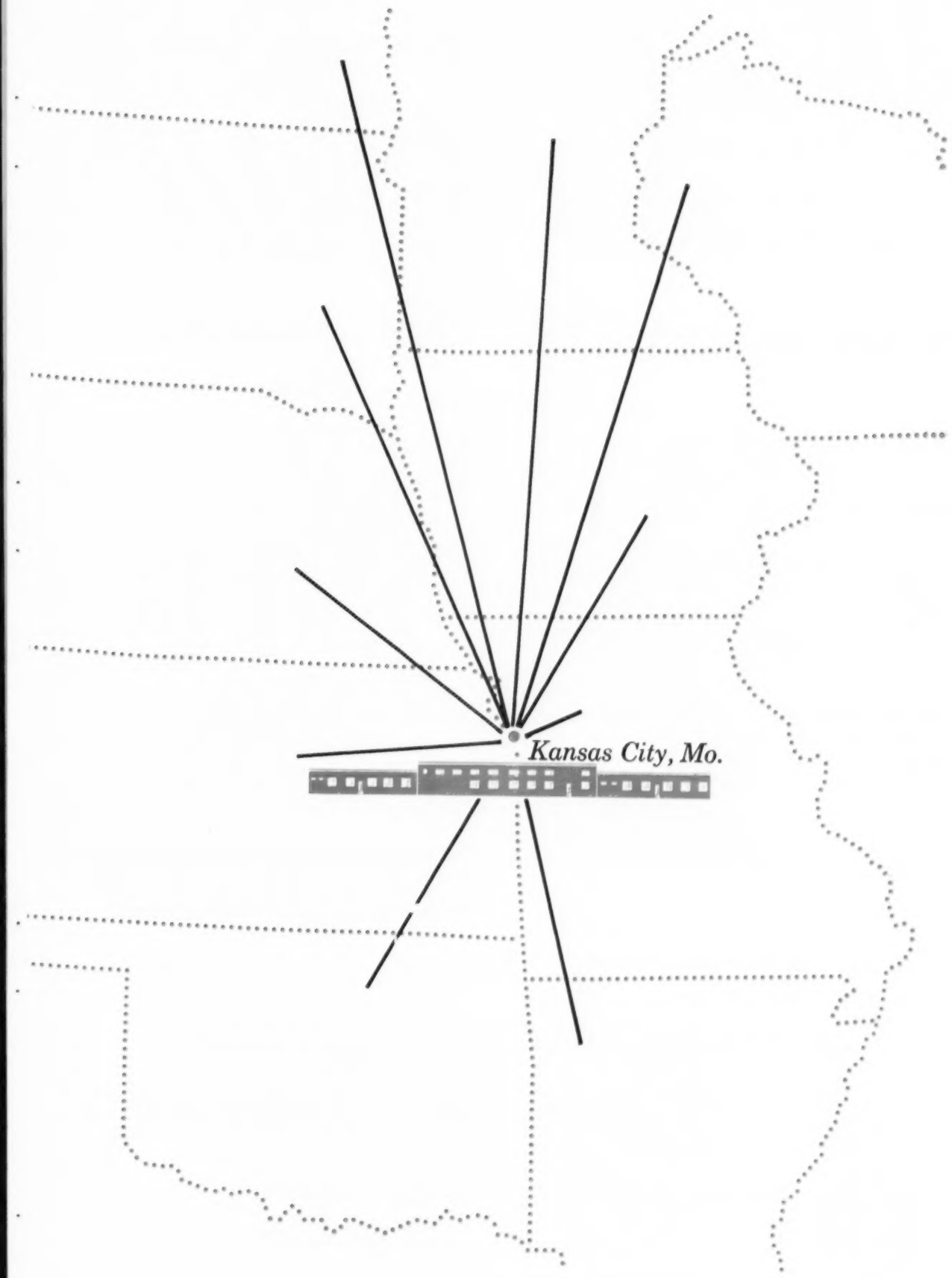
The new Kansas City plant will furnish such exclusive St. Regis developments as Lustergrip, STRuctural STRip and many other features designed to give you better bags and lower packaging costs.

Call The Man from St. Regis!

MULTIWALL PACKAGING DIVISION

ST. REGIS PAPER COMPANY

230 Park Avenue, New York 17, N. Y.


Kansas City, Mo.

Sulphur

helps to create headline products

ALUMINUM

Surely a 'headline product' even if not new! Aluminum is very much in the news today for it is playing a leading role in our steadily expanding economy.

What's all this got to do with Sulphur?

It's like a chain reaction. Demand for this remarkable light metal is increasing. This calls for more ore development and additional mills for the reduction of alumina to aluminum. More cryolite is needed for fluxing the molten alumina in the electrolytic cells.

True, cryolite (Na_3AlF_6) is found in nature but there just isn't enough tonnage to satisfy its many uses. So, to fill the supply gap, cryolite is being synthesized from fluorspar. It is here that Sulphur enters the picture, for one of its widely used derivatives – Sulphuric Acid – is a key reaction agent.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

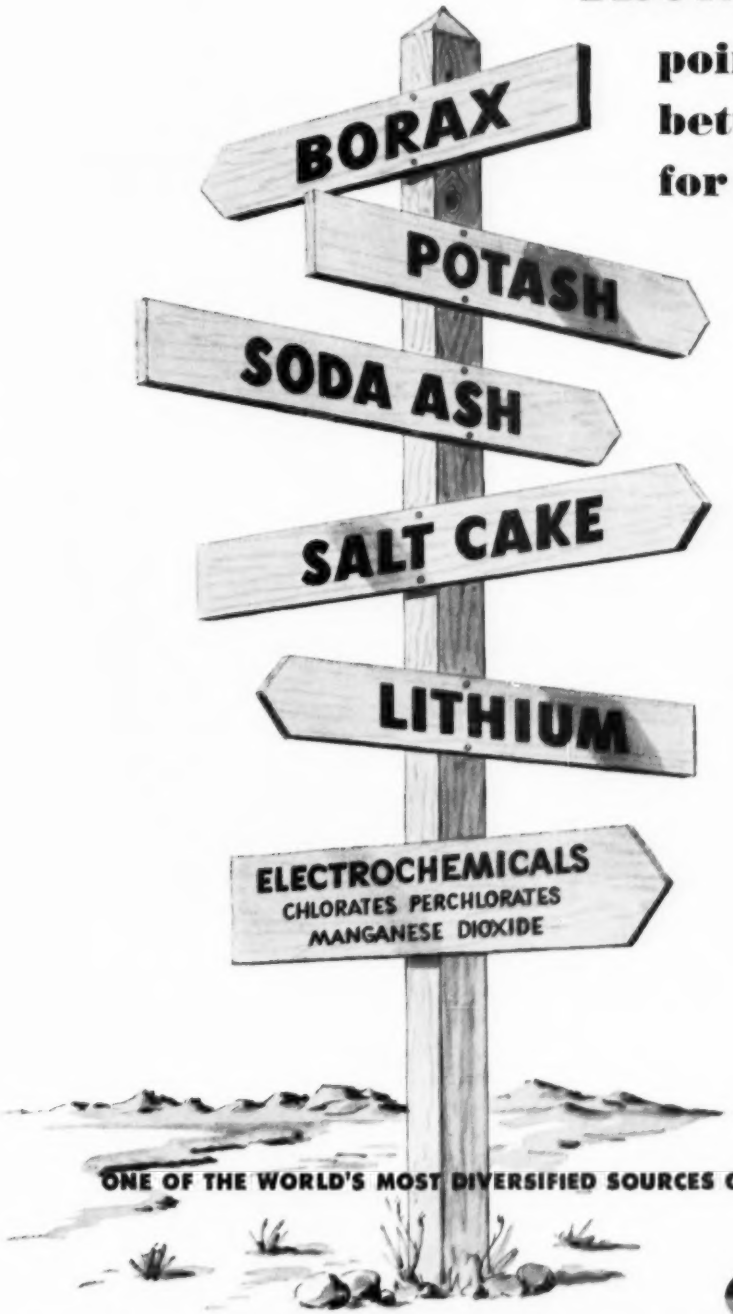
Sulphur Producing Units

- NEWGULF, TEXAS
- SPINDLETOP, TEXAS
- MOSS BLUFF, TEXAS
- WORLAND, WYOMING

in every direction...

TRONA® CHEMICALS

point the way to better products for modern living



...through

BROAD DIVERSIFICATION

Best proof of Trona's versatility is the depth of Trona's services and ever-increasing demand for Trona products.

EXPANSIVE TECHNOLOGY

Greater productivity at Searles Lake, the new plant of American Lithium Chemicals, Inc., and acquisition of Western Electrochemicals, all attest to progress and growth.

RESEARCH AND DEVELOPMENT

Trona is a pioneer and leader in a long-range research and development program for lithium and boron chemicals in its Whittier (Calif.) Research Laboratory.

ONE OF THE WORLD'S MOST DIVERSIFIED SOURCES OF BASIC CHEMICALS VITAL TO INDUSTRY AND AGRICULTURE

TRONA

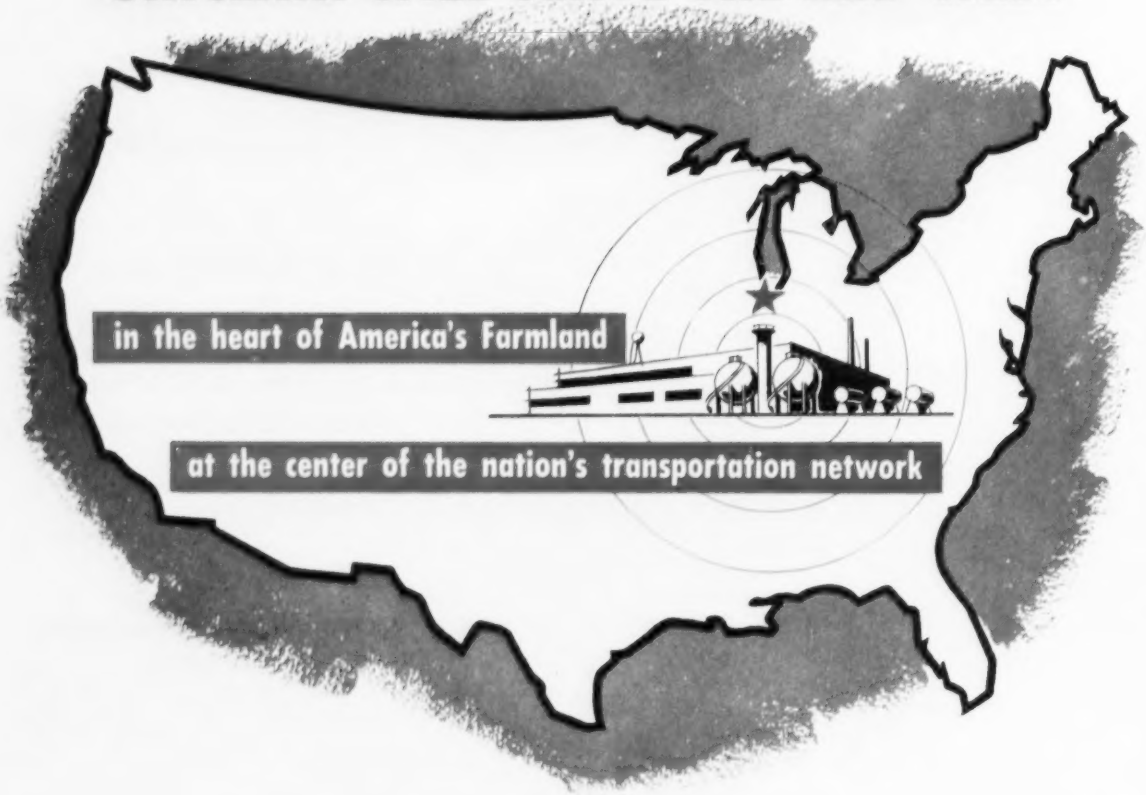
American Potash & Chemical Corporation

Offices · LOS ANGELES, NEW YORK, SAN FRANCISCO
· ATLANTA, PORTLAND (ORE.)
Plants · Trona and Los Angeles, California
· San Antonio, Texas *(American Lithium Chemicals, Inc.)*
· Henderson, Nevada
Export Division · 99 Park Avenue, New York 16, New York

Producers of: **BORAX • POTASH • SODA ASH • SALT CAKE • LITHIUM • BROMINE • CHLORATES • PERCHLORATES • MANGANESE DIOXIDE and a diversified line of specialized agricultural and refrigerant chemicals.**

A new source for nitrogen chemicals

SINCLAIR WILL SERVE THE MID-WEST



Strategically located in Hammond, Indiana, this ultra-modern plant will soon be on stream — producing high purity anhydrous ammonia and nitrogen fertilizer solutions for agriculture and industry.

The central location of this plant is of prime importance to you. It means *fast, low cost delivery* of your nitrogen needs via Sinclair's fleet of tank cars and tank trucks. Moreover, vast storage facilities will enable Sinclair to supply you with top quality products during your busiest periods.

For further information about how this new plant can meet your nitrogen supply problems, phone or write

SINCLAIR CHEMICALS, INC.

(Affiliate of Sinclair Refining Company)

600 Fifth Avenue, New York 20, N. Y. • Phone Circle 6-3600
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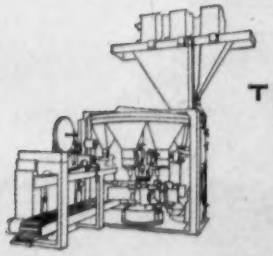

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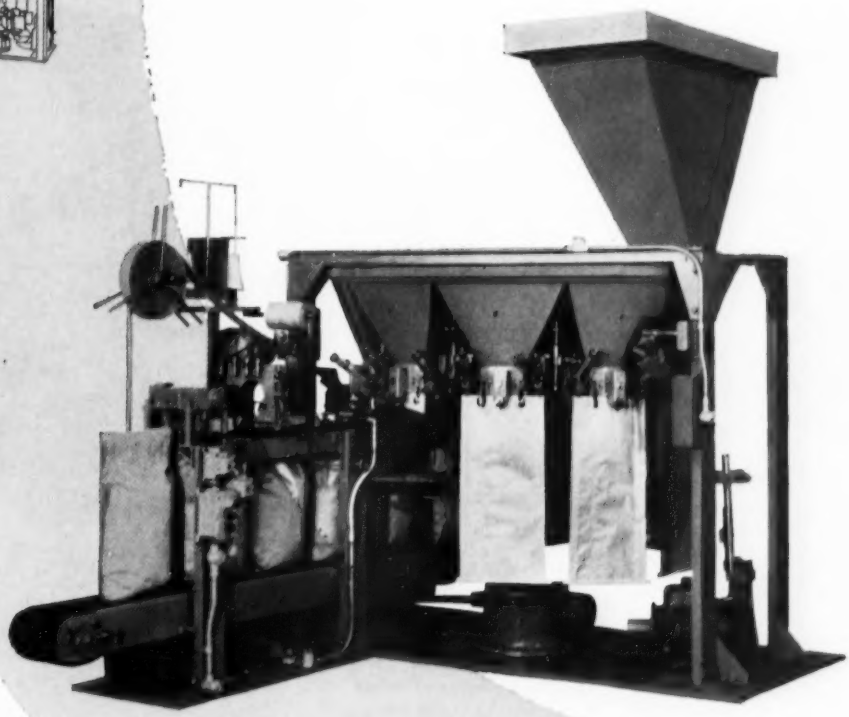

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The Model "A" BAGPAKER® for 25 years has proved there is no better method than the rotary turret for maintaining a high packing rate. Not one Model "A" BAGPAKER® installed by us has ever been replaced by another design.

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1ST ANNUAL CONVENTION for NPFI

GEOGHEGAN

E. A. Geoghegan, chairman of NPFI board, and vice-president of Southern Cotton Oil Company, New Orleans.

Plans have been completed for the first annual convention of the National Plant Food Institute, at The Greenbrier, White Sulphur Springs, West Virginia, June 10-13.

More than 1,000 persons representing fertilizer manufacturers, material producers, and others will attend meetings of the Institute, the program for which will feature prominent leaders in the field of Government, industry and agricultural communications. Senator J. W. Fulbright (D-Ark.), Chairman of the Senate Committee on Banking and Currency, will give the principal address on June 12.

Meetings of the Executive Committee and Board of Directors of the Institute will be held on June 10 and the first general session will follow on June 11.

J. A. Howell of Richmond, Va., president of the National Plant Food Institute, will preside and the following speakers will be heard on June 11:

Russell Coleman, executive vice president of the Institute will give a visual presentation on "One Year of Service."

Drs. J. M. Bohlen and G. M. Beal, associate professors of rural sociology, Iowa State College, will give a visual demonstration on "Who Influences the Farmer?".

Glenn R. Fouche, president, The Stayform Company, Chicago, will speak on "Dramatize Your Selling."

Mr. Fouche has been active for 20 years with The National Association of Direct Selling Companies and served two terms as president and is still a director of that association. He has been a constant booster for higher ethical standards in the direct selling field. Many success stories in his own organization are the lengthened shadows of his own boundless energy and enthusiasm.

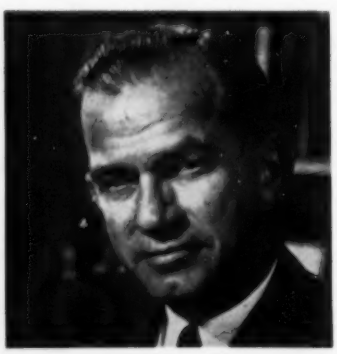
In 1950 when Paul Hoffman of ECA asked Red Motley to take a team of American businessmen to England and Scotland to tell the British—"How We in America Sell"—Mr. Fouche was one of the ten men selected to speak in London, Glasgow, Edinburg and other industrial centers in the British Isles.

He is active in the Executives Club in Chicago, The Chicago Association of Commerce and The Sales Executives Club of Chicago. He is in demand as an after-dinner speaker and has spoken throughout the country before many civic organizations, sales executives clubs and company sales conventions.

A business meeting of the Research and Education Committee will be held in the afternoon of June 11.

Senator J. W. Fulbright (D-Ark), Chairman of the Senate Committee on Banking and Currency and prominent in the field of foreign affairs, principal speaker at NPFI.

FULBRIGHT



HOWELL

Joseph A. Howell, NPFI president, and president of Virginia-Carolina Chemical Corporation, Richmond.

President Howell also will preside at the sessions on June 12, which will feature:

The premiere showing of the Institute's new movie, "What's In The Bag?".

The presentaion of the Institute's annual "Soil Builders Award for Editors" winners, by Louis H. Wilson, secretary and director of information of the Institute.

A time-lapse film presentation on "Seeing Plants Feed" by John Ott of John Ott Pictures, Inc., Winnetka, Illinois, a national authority on time-lapse photography.

Senator Fulbright will speak on "Our Nation's Role in World Tension."

The Institute's annual business meeting also will be held on June 12, preceded by a Memorial Resolution presented by Hugo Riemer of New York City, Chairman of the Memorial Committee.

The Institute's Board of Directors will hold a breakfast meeting on June 13.

A Hospitality Hour, courtesy of the Nitrogen Producers, will be held in the evening of June 11.

The annual banquet of the Insti-

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THE CAR YOU MIGHT NEED TOMORROW IS ROLLING TODAY

If you suddenly find yourself on the spot . . . need a car or two in a hurry, there's usually one or more on track nearby which can be diverted to you overnight. That's the kind of routine service you can expect and get from *International*.

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Dr. George M. Beal, left, associate professor of Economics and Sociology and Dr. Joe Bohlen, associate professor of Rural Sociology, both from Iowa State College, will be featured at the opening session of the Convention.

They will make a visual presentation on the results of an extensive survey on "Who Influences the Farmer," on Monday, June 11.

Dr. Beal, a 1943 graduate of Iowa State, received his MS and PhD degrees at the same institution in 1947 and 1953, respectively. His interests in sociology have been concerned particularly with social action, the diffusion process, community organization and group dynamics.

Dr. Bohlen, a 1947 graduate of Iowa State, received his MS and PhD degrees from the same institution in 1948 and 1954, respectively. His particular interests have been in the field of rural organizations and group processes.

One of the outstanding features of the Convention will be two presentations by John Ott featuring time-lapse photographic stories on "Watching Flowers Grow" and "Seeing Plants Feed."

The presentation on "Watching Flowers Grow" will be presented for the ladies attending the Convention on Monday, June 11 and the presentation on "Seeing Plants Feed" on Tuesday, June 12.

Mr. Ott is shown below with his eight-year-old son, Henry, who will be seen in the film presentations.

Several of the scenes in the Institute's feature film, "Making the Most of a Miracle" were produced by Mr. Ott.

Mr. Ott first showed his films on television in the early part of 1949, soon after the first station started in Chicago.

Since then, he has supplied films or taken part in various TV programs including the network programs "Home," "Today," "Zoo Parade" and "Out on the Farm," in addition to doing his own television show regularly "How Does Your Garden Grow," which is now in its sixth year. The Radio Corporation of America used John Ott's time-lapse pictures to demonstrate color TV to the FCC when approval was won for the RCA system, and his garden program was the first to originate in color from Chicago.

Walt Disney uses many of John Ott's pictures in such award winning films as "Nature's Half Acre," and will feature John Ott and his special time-lapse equipment on the Disneyland program September 26th. This will explain how 20 time-lapse cameras were kept continuously working day and night for three years to produce approximately 15 minutes of film for the new Disney feature "Secrets of Life."

While the color and beauty of Mr. Ott's films have won him recognition in the field of entertainment, he also has done considerable research through time-lapse photography, such as the study of cancer growth, effect of new drugs, growth reactions of pollen in connection with hay fever and other allergies, as well as showing the effects of weed killers on plants.

tute will be held on Tuesday, June 12, preceded by a Hospitality Hour, courtesy of the Potash Producers.

The Ladies Program for the Convention follows:

June 10—4:00 p.m.—Ladies' Garden Party.

June 11 — 10:00 a.m. — Tour — Greenbrier Hotel. 11:00 a.m.—Film presentation of "Watching Flowers Grow" by John Ott. Open—Tennis—Doubles only—See Tennis Committee-Men's, Ladies' and Mixed.

2:00 p.m.—Ladies' Bridge and Canasta Party.

June 12 — 10:00 a.m. — Ladies' Golf Tournament and Ladies' Putting (non-golfers). Open—Tennis—Doubles only—See Tennis Committee, Men's, Ladies' and Mixed. 2:00 p.m.—Ladies' Putting (Golfers).

Committees for the Convention are as follows:

MEMORIAL COMMITTEE: Hugo Riemer, Chairman. L. Dudley George and G. H. Kingsbury.

HOSPITALITY COMMITTEE: Mr. and Mrs. F. J. Woods, Co-chairmen. Mr. and Mrs. Horace M. Albright, Mr. and Mrs. B. W. Bellinger, Mr. and Mrs. J. C. Bennett, Mr. and Mrs. R. E. Bennett, Mr. and Mrs. E. N. Carvel, Mr. and Mrs. T. W. Childs, Mr. and Mrs. W. B. Copeland, Mr. and Mrs. J. E. Culpepper, Mr. and Mrs. James F. Doetsch, Mr. and Mrs. Marlin Geiger, Mr. and Mrs. W. B. Hicks, Mr. and Mrs. E. M. Kolb, Mr. and Mrs. R. B. Lenhart, Mr. and Mrs. A. F. Reed, Mr. and Mrs. J. W. Rutland, Mr. and Mrs. J. C. Totman, and Mr. and Mrs. T. M. Ware.

HORSESHOE PITCHING CONTEST COMMITTEE: A. A. Schultz, Chairman. H. G. Cunningham, M. G. Field, C. R. Martin, H. A. Parker and R. Q. Parks.

TENNIS COMMITTEE: Joseph Mullen, Chairman, A. J. Dickinson, George H. Dunklin, Mrs. G. D. Glover, Mrs. John J. Weldon and W. N. Watmough, Jr.

COMMITTEE ON PRIZES: Mrs. J. F. Corkill, Chairman. Mrs. Dean R. Gidney, W. R. Morgan and R. S. Rydell.

MEN'S GOLF COMMITTEE: R. S. Rydell, Chairman. J. D. Collins, John W. Hall, Clyde T. Marshall, W. R. Morgan and Gene Van Deren.

LADIES' GOLF COMMITTEE: Mrs. J. D. Stewart, Jr., Chairman. Mrs. R. H. Linderman, Mrs. B. P. Redman, Mrs. John B. Sanford, Mrs. W. T. Seele and Mrs. G. Albert Woods.

LADIES' COMMITTEE: Mrs. J.

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State Agricultural Experiment Stations and other authoritative sources are recommending fertilizers with ever increasing plant food units per ton. High analysis fertilizers are in demand because they give more for each fertilizer dollar. Meet this demand by incorporating Davison's New Triple Superphosphate in your formulation.

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N P F I

(Continued from page 22)

A. Howell, Chairman and Mrs. George E. Petitt, Vice Chairman. Mrs. John A. Miller, Mrs. Edwin Pate, Mrs. J. E. Totman and Mrs. Louis Ware.

BRIDGE AND CANASTA COMMITTEE: Mrs. John R. Taylor, Jr., Chairman. Mrs. C. C. Arledge, Mrs. Thomas E. Camp, Jr., Mrs. George W. Gage, Mrs. C. E. Reger, and Mrs. Tom Wright.

Sports events have been scheduled as follows:

June 11—Members golf tournament (men) and Tennis tournament (doubles only) men's, ladies' and mixed. 1:30 p.m.—Horseshoe pitching tournament.

June 12—Members golf tournament (men); Veterans' Golf Tournament (men); Guests' Golf Tournament (men); and Tennis Tournament (doubles only) men's, ladies' and mixed. 10:00 a.m.—Ladies golf tournament and Ladies' putting (non-golfers). 1:30 p.m.—Horseshoe pitching tournament. 2:00 p.m. — Ladies' Putting (golfers).

Southern Soil Conference Nov. 2

Southern soil scientists and representatives of the fertilizer industry will hold a Work Conference at the Atlanta Biltmore Hotel, Atlanta, Ga., on November 2, "to review new research findings in agriculture and to discuss problems of mutual concern to the land-grant colleges, state departments of agriculture, and the fertilizer industry." Announcement of the meeting was made by Dr. Howard T. Rogers, head of the agronomy department at Alabama Polytechnic Institute at Auburn and chairman of the Southern regional soil research committee, and Dr. Russell Coleman, executive vice-president of the National Plant Food Institute.

The Southern regional soil research committee will hold its annual meeting on November 1 also at the Atlanta Biltmore Hotel. This committee which is composed of soil scientists and agronomists from the state agricultural experiment stations and the U. S. Department of Agriculture meets annually to review cooperative studies and to make plans for integrating their work in the Southern Region. Dr. W. E. Colwell, assistant director of research at the North Carolina Agricultural Experiment Station, serves as advisor to the regional soil research group. Dr. W. H. Garman, chief agronomist, National Plant Food Institute, is chairman of the joint industry-college planning committee.

Individuals planning to attend the Work Conference on November 2 have been requested to make their reservations directly with the Atlanta Biltmore Hotel.

Canada Plant Food Convention July 4-8

The Plant Food Producers of Eastern Canada meeting July 4-8 will occupy the beautiful Mont Tremblant Lodge, Mont Tremblant P. Q. The program, as we go to press, has not yet been announced. Members and visitors are asked to make their own arrangements with the Lodge for early arrivals or late departures.

Pacific N.W. Association Reports on Demonstrations

A report recently issued by the Pacific Northwest Plant Food Association showed excellent results on their demonstration farm. This was chosen for its previous low production history and by following recommended fertilizer practices doubled hay production and showed a 2½ times carrying capacity on the seeded pasture and doubled hay production with a return of $2.30 for each dollar invested in fertilizer. The Association sponsored the fertilizer purchase and several Spokane wholesale dealers supplied the grass and legume for last year's test. They plan to continue the test through the 1956 crop year.

Okla. Dealers And Soils, Crops Conf. Combined

Plans are well under way for the 1956 Oklahoma Fertilizer Dealers Conference to be held November 28 at Oklahoma A & M College, Stillwater.

The Dealers Conference this year will be held in conjunction with the annual Oklahoma Soils and Crops Conference which heretofore has been conducted in February but is now scheduled to be held November 29, the day following the Oklahoma Fertilizer Dealers Conference.

The Oklahoma Fertilizer Dealers Conference is sponsored by the Oklahoma Plant Food Educational Society for fertilizer dealers for the purpose of discussing agronomic information and better ways to promote and merchandise agricultural chemicals by the dealer.

The program committee recently met at Oklahoma A & M College to discuss and plan the 1956 program.

The following persons are serving on the 1956 Program Committee: Dr. M. D. Thorne, Head, Agronomy Department, Oklahoma A & M College; Dr. Lester Reed, Agronomy Department, Oklahoma A & M College; Mr. Wesley Chaffin, Extension Agronomist, Oklahoma A & M College; Mr. Parks Yeats, Fertilizer Control Official, State Board of Agriculture; Mr. Max Fry, Fry Seed and Fertilizer, Blackwell, Okla.; Mr. John Freiburger, Bar Dew Hdwe. and Feed Co., Bartlesville; Mr. Jack Tyler, Dowell-Tyler Fertilizer Company, Stillwater; Mr. Harold Groce, Manager, Co-Op Elevator, Marshall; Dr. W. E. Irwin, Phillips Petroleum Co., Bartlesville; Dr. W. L. Garman, Grand River Chemical Company, Tulsa; Mr. George Summers, Jr., American Cyanamid, Stillwater; Mr. Dick Kenyon, Phillips Petroleum Co., Bartlesville; Mr. Perry Onstot, Davison Chemical Company, Joplin, Mo., Program Chairman.

API To Conduct Fertilizer Talks

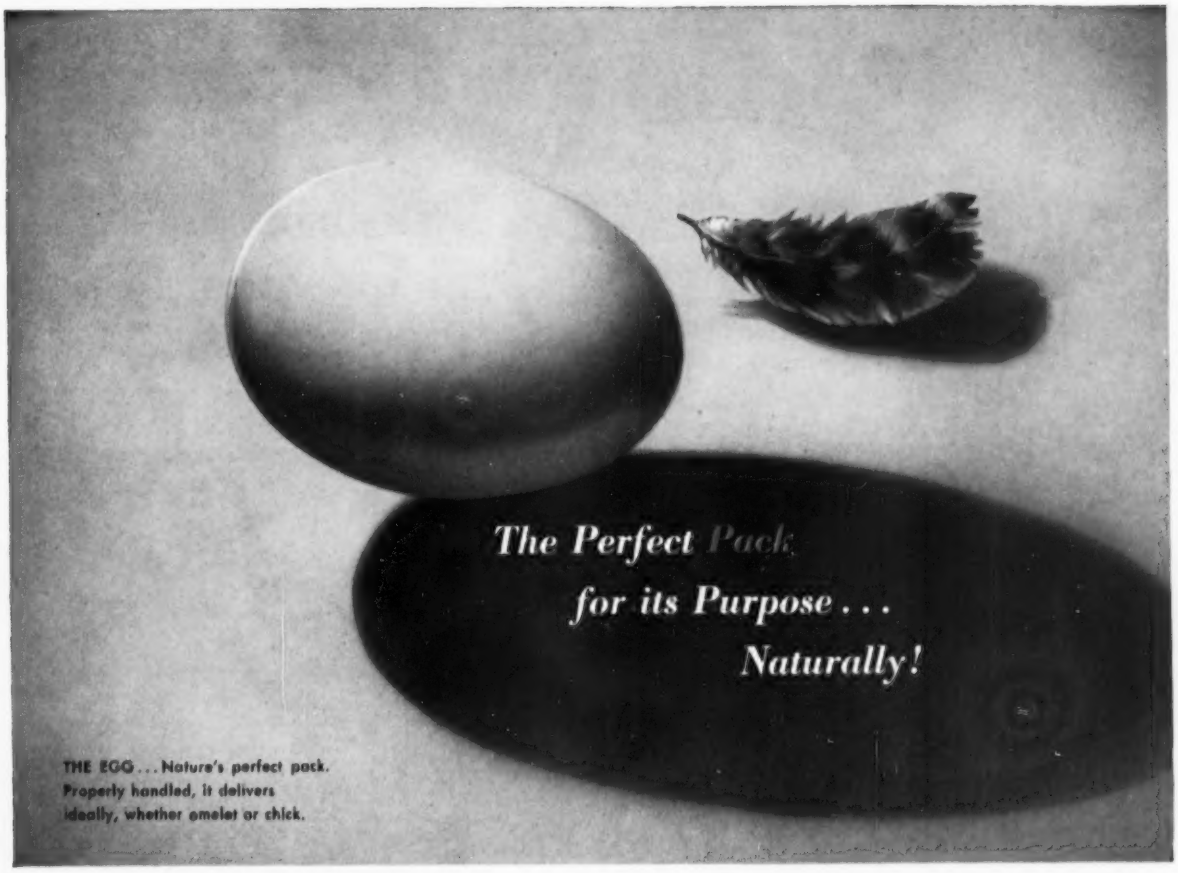
A three-day fertilizer conference is scheduled to be held at API's Agricultural Experiment Stations, Auburn, Ala., beginning June 5, J. C. Lowery, API Extension agronomist, has announced.

Dr. Lowery said the first session will be held at Sand Mountain Substation near Crossville. On June 6, the session will begin at the API Experiment Station near Auburn and then move to the Piedmont Substation at Camp Hill. The third session, June 7, will be held at the Wiregrass Substation at Headland.

The conference will be attended by farmers, fertilizer manufacturers, distributors and dealers and others interested in the work being done at research fields to increase yields on Alabama farms through more efficient use of plant foods.

Conn. Field Day Date Now Aug. 15

Date of The Connecticut Agricultural Experiment Station Field Day has been changed to August 15, Neely Turner, vice-director of the Station, reports. The Field Day is held at the Station's 55-acre experimental farm in the Mt. Carmel section of Hamden.



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"Fertilizer manufacturers! Our savings have been so impressive we have installed five additional machines."

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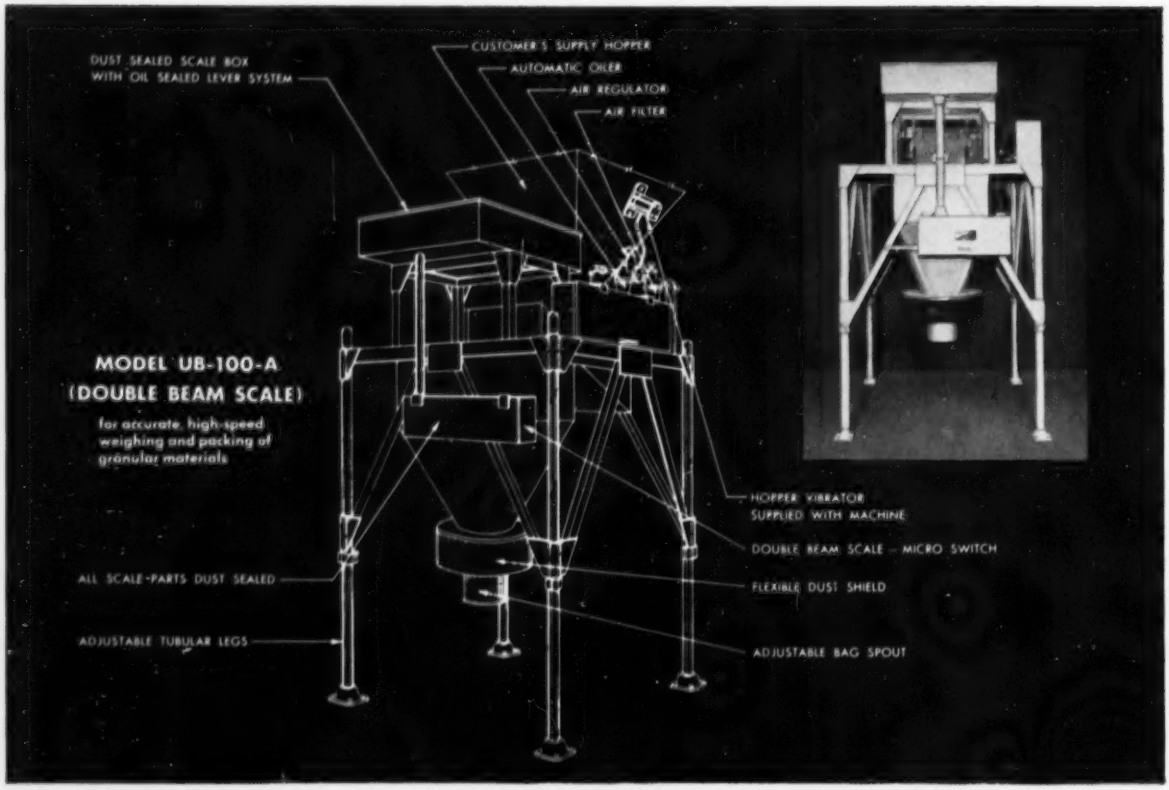
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MODEL UB-100-A (DOUBLE BEAM SCALE)
for accurate, high-speed weighing and packing of granular materials
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DOUBLE BEAM SCALE – MICRO SWITCH
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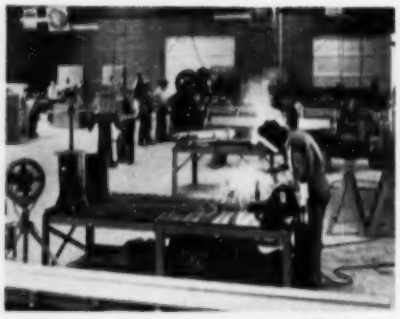
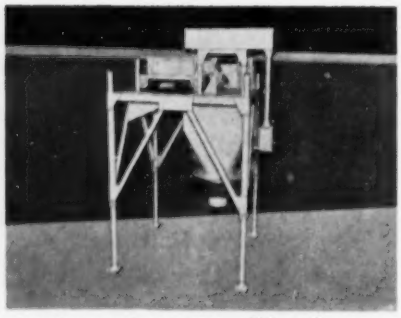
ALL SCALE-PARTS DUST SEALED
ADJUSTABLE TUBULAR LEGS



THE PLANT THAT DEMAND BUILT—Union's I & C Bagger is manufactured in this new Inglett & Corley plant, located in Augusta, Ga. Substantially increased capacity insures prompt delivery of all models.



SIMPLIFIED INSTALLATION—Shipped completely factory assembled and checked. Can be installed in hours. Adjustable legs may be compacted. Unit can be readily moved into position and quickly adjusted to the supply hopper.

TRAINED UNION TECHNICIANS—The I & C Bagger is installed and serviced by Union Bag machinery experts. These technicians are based so that they are available for immediate assistance if needed.

TO UNION BAG'S I & C BAGGER, WE HAVE PRODUCTION BY 50%, ON LABOR"

C. L. Durham
Plant Superintendent
Dixie Guano Co., Laurinburg, N. C.

"The I & C Bagger has enabled us to up production to 50 to 60 tons of fertilizer per hour, compared to 35 to 40 tons in the past," says Dixie Guano plant superintendent C. L. Durham, "and we've been able to do it with one weighing operator instead of three. The I & C is as fast and efficient a bagger as I've ever encountered. Its performance has been little short of sensational."

PEAK PRODUCTION

Dixie Guano's I & C installation has given the company's Laurinburg, N. C., plant an average production rate of 16 to 17 100-lb. Multiwalls per minute. "That's as fast as a man can get bags under the spout," says Mr. Durham.

GAINS FOR OTHER FERTILIZER MANUFACTURERS

Fertilizer companies who have seen the I & C Bagger in operation have bought more than 200 units in the past two years. Regardless of the size of their plants, manufacturers have found that the I & C Bagger reduces packaging labor costs, increases production, and can bring about important economies in the cost of the Multiwall bags themselves.

SEE THE PROOF!

Ask for details on how one small plant is saving over $50 a day in reduced manpower and increased production with a single machine . . . why a major producer has installed a dozen I & C Baggers . . . why another leading manufacturer has converted nine plants to the I & C.

Almost certainly, the same opportunities for greater packaging efficiency are present in your own company. Get the facts today.

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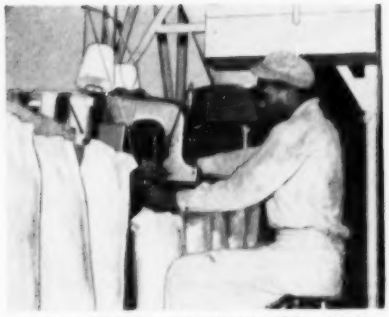
The I & C Bagger used by Dixie Guano, Model UB100-A—works in conjunction with a moving conveyor and sewing head.

The weighing and filling cycle is completely automatic. It begins when the bag filling operator pushes the starter button. This automatically delivers the fertilizer through the bag spout into the bags in an endless series of pre-weighed charges.

The filled weight drops each of the open mouth multiwall bags on to the moving conveyor which carries them to the sewing head.



UP TO 20 100-LB. BAGS A MINUTE! New high-speed packaging for the fertilizer industry! Twenty 100- or 50-lb. Multiwalls per minute; 400 to 500 tons in an eight-hour day. Completely automatic filling and weighing cycle.

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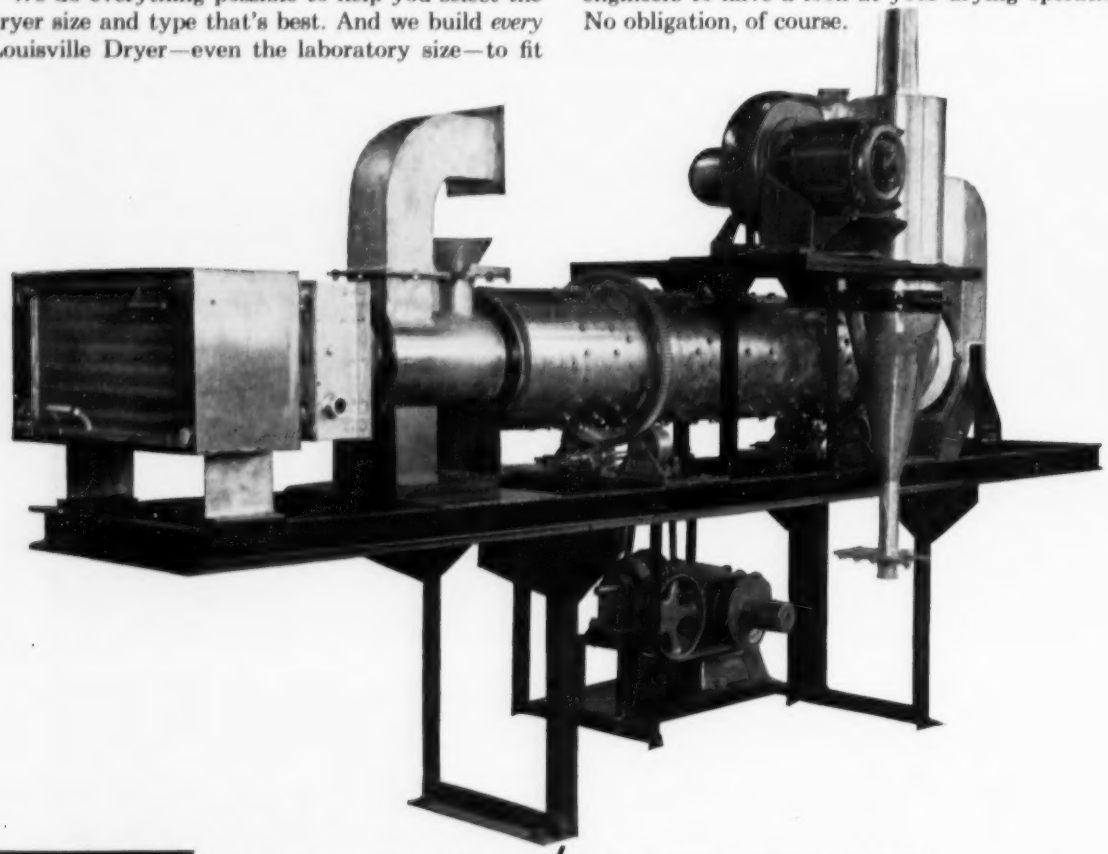

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In many cases, a simple change in materials . . . rate of ammoniation . . . or chemical and physical characteristics can make differences in formulation results and cost of manufacture.

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What's more, the man from Sohio is trained to help you in your selection. He knows formulation problems. And, he's prepared to work out advantages of shipping and handling . . . or show you ways to use Sohiogen's increased flexibility to greatest cost-cutting advantage.

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In granulation, too, UAL works well! Gives hard, uniform granules that are best for storage and application. If you're thinking of granulation in your future plans, ask us about UAL.

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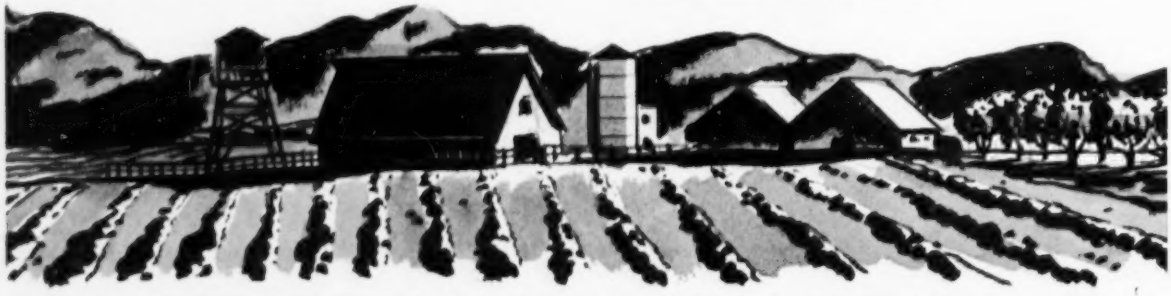

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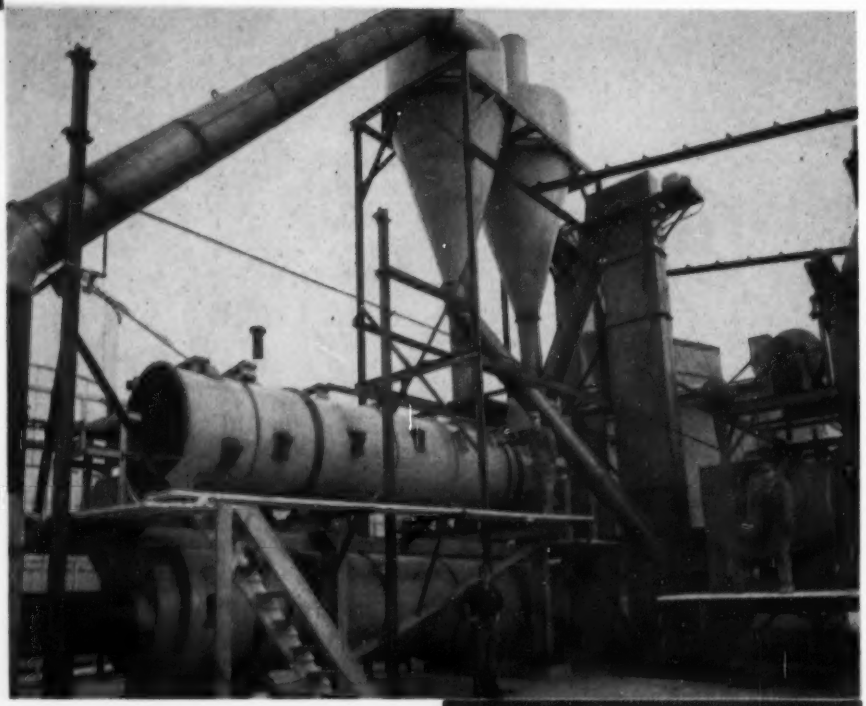

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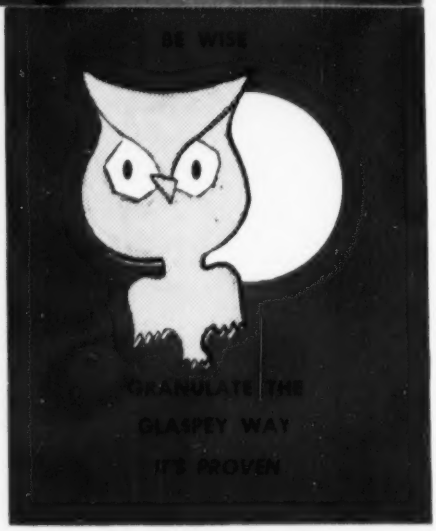

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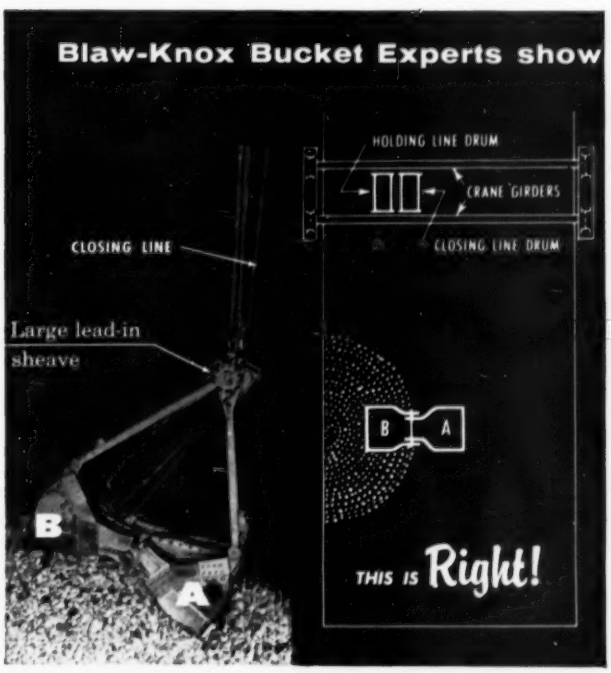

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ECONOMICS OF MANUFACTURE OF LIQUID MIXED FERTILIZERS

Originally undertaken to guide TVA's own development planning, this thoroughgoing study compares cost factors for liquid and solid fertilizers sectionally. While cost and price data cited here, as the author points out, are only illustrative, your editors feel these data afford a broad-scale, impartial basis for relative comparison.

by
Z. A. Stanfield
Tennessee Valley Authority
Wilson Dam, Alabama

Note: Presented at Seminars for Co-operators in the TVA Agricultural Economics Research Activities at Knoxville, Tennessee, March 27-30, 1956.

The manufacture and use of liquid fertilizers containing two or more of the major plant nutrients have received considerable attention during the past few years. Several papers have been published on this subject (**2, 3, 4**). Most of the activity in this business has occurred in California and some has occurred in the Midwest and Southwest.

Although significant, the estimated quantity of liquid mixed fertilizers used in the United States has been very small in comparison with the total estimated quantity of mixed fertilizers. For example, one estimate (**4**) showed that the quantity of liquid mixed fertilizers used during 1953-54 was 27,548 tons, or less than 0.2% of the total amount of mixed fertilizers used.

The present growth of the business began with the introduction on the market of "phosphatic fertilizer solution" at a price low enough to compete in some areas on the fertilizer materials market. In addition to use in making liquid mixed fertilizers, this phosphoric acid solution is used in making solid nitric phosphate fertilizers. The material usually is sold as 75% H_3PO_4. It is made by burning elemental phosphorus.

Previously, the price of phosphoric acid from phosphorus was too high for it to be considered as a fertilizer material. Most of the phosphorus is used to make chemicals that are marketed at a higher price than fertilizers.

The liquid mixed fertilizer industry currently appears to be in a period of market development and early growth. Many plants are operated only during the sales season and some plants are additions to existing solid fertilizer businesses. Different types of processing and marketing techniques are being carried on and tested.

The present study points out some of the economic factors in evaluating liquid mixed fertilizers and suggests methods of taking them into account. The cost and price data developed for this purpose are only illustrative and cost and price data developed for most commercial situations are expected to be different from those of this paper.

The method used for the purpose of the present study was to compare the relative economics of the manufacture of liquid and solid mixed fertilizers. Estimates were made of the investment and production costs for hypothetical new complete plants and of the hypothetical selling prices for various grades of fertilizers made in these plants. Information on process technology was obtained from the literature for the liquid products and from TVA pilot-plant work for the solid products. The study was based on (a) purchase of raw materials at current market prices, (b) conversion of these materials to finished products, (c) storage of the finished products at the manufacturing plant in forms suitable for sale to distributors, and (d) distribution of products to the consumer.

Assumptions for Estimates

The estimates were made for five different sales volumes: 2,500, 5,000, 10,000, 20,000, and 40,000 tons of product per year. For each sales volume, three types of operation were assumed. In the first case, the plant was designed for seasonal operation with provision for only 2 days of product storage. In the second case, the plant was designed for operation 6 months per year with provision for storage of 20% of the sales volume. In the third case, the plant was designed for operation 12 months per year with provision for storage of 40% of the sales volume. These variations were selected in order to determine the economic efforts of scale and method of operation.

The acid-neutralization method was selected for the manufacture of liquid mixed fertilizers. By this method, phosphatic fertilizer solution is neutralized with ammonia. Other nitrogenous materials, such as urea and ammonium nitrate, are added to increase the ratio of nitrogen to P_2O_5 in the product. Potassium chloride is added to provide K_2O. Sufficient water is added to dissolve the salts that are formed in the reactions and to make the desired grade of product. It is desirable to produce neutral solutions so that low cost steel tanks can be used to store and transport the products. Product grades assumed for the study were 10-10-10, 5-10-10, and 8-24-0. Grades with concentrations higher than those selected do not appear practical using existing known technology.

The process selected for the manufacture of solid mixed fertilizers was that in which the TVA-type continuous ammoniator is used (**1**). In this process, superphosphates are ammoniated with nitrogen solutions and other materials are added in the ammoniator to make the desired grades. The ammoniator product goes to a granulator and then to a rotary dryer. In making some grades, the dryer is not required. The product is sized and the oversize and fines are recycled. Product of the desired size is stored in the product-storage building and is shipped either bulk or bagged. Product grades assumed for the study were 10-10-10, 15-15-15, 6-12-12, 10-20-20, and 8-24-0.

It was assumed that plants would be located in the South Atlantic and Pacific regions. The former was selected because of its established solid mixed fertilizer industry, high rate of fertilizer consumption, and relatively low price of superphosphate. The latter region was selected because of its rapidly expanding fertilizer industry, present low rate of fertilizer consumption, and relative high price of superphosphate. Conditions in the South Atlantic and Pacific regions appeared to be typical of conditions that are least favorable and most favorable, respectively, for liquid mixed fertiliz-

ers. Conditions in other regions probably are intermediate between the two regions selected.

Estimates of cost of construction of process plants and storage facilities were based on typical 1955 conditions. These estimates were made for comparative purposes only, and it is probable that plant estimates made for an actual set of particular conditions would be somewhat different from these estimates. The same method of estimating was used for both processes. The estimates included provision for process equipment, raw material storage, product storage, buildings, engineering and construction supervision costs equal to 10% of physical cost, and an item for contingencies equal to 20% of physical cost. Working capital was calculated as being equal to 1 month's production cost.

Estimates of production cost were prepared for each assumed method of operation and sales volume. Typical current market prices for the raw materials in each region were used. The most economical formulation was used for each grade of product. Operation labor schedules were prepared for each set of conditions and average rates of pay for each class of work were used. Seasonal use of labor was assumed in appropriate cases. Estimated costs of utilities, supplies, chemical analyses, and plant overhead were included. Estimates of costs for depreciation, property tax, and insurance were included in production cost.

Estimates of manufacturer's selling price were made for each case. Selling price was assumed to be equal to the sum of production cost, selling expense of $3 per ton of product in each case, and 30% annual pretax return on total investment including working capital. The basis for prices of liquids was f.o.b. works loaded in tank cars or tank trucks for shipment. The basis for prices of solids was f.o.b. works, bagged and bulk, loaded in cars or trucks for shipment.

Results of Estimates

Effect of Sales Volume

Estimated selling prices of liquid and solid 10-10-10 fertilizers for the South Atlantic and Pacific regions are shown in Figures 1 and 2. The estimates showed that sales volume had a considerable effect on the selling prices for both the liquid and solid products. The estimated selling prices at the annual sales volume of 2,500 tons were about 40% higher than those at the annual sales volume of 40,000 tons. These results indicate that a small producer of either liquid or solid mixed fertilizers would be at a competitive disadvantage in comparison with large producers. The disadvantage of being a small producer is somewhat less for liquids than for solids.

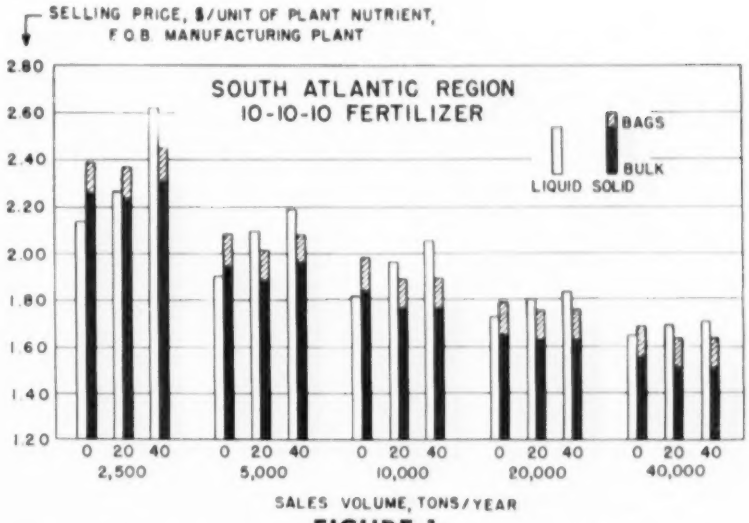

FIGURE 1
EFFECT OF SALES VOLUME AND SEASONAL OPERATION ON SELLING PRICE IN SOUTH ATLANTIC REGION

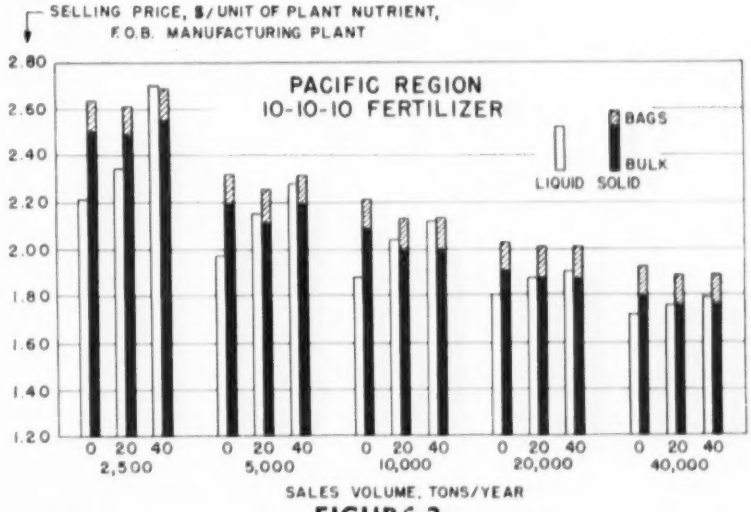

FIGURE 2
EFFECT OF SALES VOLUME AND SEASONAL OPERATION ON SELLING PRICE IN PACIFIC REGION

There was a significant decrease in estimated unit capital cost with increase in sales volume for both types of plants. For example, using the 10-10-10 grade and 6 month's operation for two shifts, 6 days per week, as a basis, estimated process plant costs for the liquid plants decreased from $25 per annual ton at the 2,500-ton sales volume to $4 per annual ton at the 40,000-ton sales volume. Estimated process plant costs for the solid plants decreased from $40 per annual ton at the 2,500-ton sales volume to $10 per annual ton for the 40,000-ton sales volume. The estimated costs of product storage facilities varied from $16 to $5 per annual ton for the liquid fertilizer plants and from $3.20 to $3 per annual ton for the solid fertilizer plants for the smallest and largest sales volumes, respectively.

It is expected that investment cost estimates based upon designs for specific conditions could be developed for both liquid and solid plants that might be 25 to 50% lower than those used in this study. However, for the purpose of comparing the

processes, the estimates of this study appear to be adequate. Decreases or increases of the investment costs used by 50% did not change the relative economic position of the processes. The wide variation of unit capital cost with sales volume for both types of plants suggests the importance of careful consideration of initial capital cost.

The effect of size of plant on operating cost is shown in Table I. For the liquid mixed fertilizers, the operating cost decreased from $10.59 to $3.23 per ton for increase in sales volume from 2,500 to 40,000 tons per year. A greater decrease was shown for the solid mixed fertilizers; the operating costs (excluding costs of bags and bagging) were $17.20 and $4.63 per ton, respectively, for the 2,500-ton and 40,000-ton sales volumes. The estimates indicate that for 10-10-10 the advantage for liquids is about 5 cents per unit at the 40,000-ton sales volume and 22 cents per unit at the 2,500-ton sales volume.

Table I. Effect of Plant Size on Costs in Liquid and Solid Mixed Fertilizer Plants

Sales volume, tons/yr.	Operating cost, $/ton product	
	Liquid	Solid (excluding bags)
2,500	10.59	17.20
5,000	9.34	10.81
10,000	8.60	9.68
20,000	5.39	7.10
40,000	3.23	4.63

Effect of Product Storage

The effect of providing for storage of different percentages of a given sales volume was different on prices of liquid mixed fertilizer than it was on prices of solid mixed fertilizer. For liquids, the lowest price was obtained for the 3-month operating period, in which case there was no provision for seasonal storage of product. For solids, the lowest price generally was obtained for the 6-month operating period, in which case provision was made for storage of 20% of the annual production.

Comparisons between liquids and solids were made on the basis of providing seasonal storage of 20% of the annual sales volume even though the lowest estimates of prices for liquids were obtained when no seasonal storage was provided. Operation of liquid mixed fertilizer plants with provision for some seasonal storage appeared to be the most likely case. Seasonal operation merely pushes the storage problem back onto the manufacturer of raw materials (phosphoric acid, ammonia, etc.). A great increase in the storage requirement of these materials probably would result in premium prices for in-season delivery.

Formulation Costs

The estimated costs of raw materials (formulation costs) for 10-10-10, 6-12-12, and 8-24-0 solid grades and 10-10-10, 5-10-10, and 8-24-0 liquid grades for both regions are shown in Table II. For the South Atlantic region, the formulation costs of solid grades were significantly lower than the formulation costs of the liquid grades of comparable plant nutrient ratio and were 28, 26, and 23 cents per unit lower for the 1:1:1, 1:2:2, and 1:3:0 ratios, respectively. For the Pacific region, the formulation cost of 10-10-10 was 10 cents per unit lower for solids; for the 1:2:2: ratio, liquid and solid formulation costs were about the same; and for the 1:3:0 ratio, the formulation cost of liquid was 10 cents per unit lower for the liquid. In this comparison the position of liquids with respect to solids was improved with decrease of $N:P_2O_5$ ratio. The improvement was most pronounced for the Pacific region.

Table II. Formulation Costs for Several Grades of Liquid and Solid Mixed Fertilizer

	Cost of raw materials, $/unit			
	South Atlantic		Pacific	
	Solid	Liquid	Solid	Liquid
10-10-10	1.08	1.36	1.33	1.43
5-10-10		1.19		1.21
6-12-12	0.93		1.19	
8-24-0	1.25	1.48	1.58	1.48

The major factor causing the different results obtained for the two geographic regions was the difference in prices of the superphosphate for the two regions. The price used for superphosphate was $18 per ton for the South Atlantic region and $30 per ton for the Pacific region. The effect of the $12 difference was to make the price of solid 10-10-10 $6.24 per ton (21 cents/unit) higher in the Pacific region.

These results indicate that a reduction in the market price of phosphatic fertilizer solution below that used in the estimates could place liquid mixed fertilizer in a more competitive position in the South Atlantic region. Calculations indicated that the price of solution would have to be cut about 10% for the selling price of liquid 10-10-10 to be the same as that of bagged solid 10-10-10.

Effect of Concentration

The effect of increasing the concentration of solid grades in the Pacific region is shown in Table III. The estimated selling price of liquid 10-10-10 was 13 cents per unit lower than the price for bagged solid 10-10-10. However, the estimated price of liquid 10-10-10 was the same as the price of bagged solid 15-15-15 made using concentrated superphosphate. The price of liquid 5-10-10 was 15 cents per unit lower than the price of bagged solid 6-12-12. However, the estimated price of liquid 5-10-10 was 6 cents per unit higher than the price of solid 10-20-20 made using concentrated superphosphate.

Table III. Effect of Increasing Concentration of Solids

	Manufacturer's selling price, $/unit, Pacific region
Bagged solid 10-10-10	1.89
Bagged solid 15-15-15	1.76
Liquid 10-10-10	1.76
Bagged solid 6-12-12	1.75
Bagged solid 10-20-20	1.54
Liquid 5-10-10	1.60

Effect of Geographic Area

The results plotted in Figures 1 and 2 show that the estimated selling price of liquid 10-10-10 was higher than either bulk or bagged solid 10-10-10 in the South Atlantic region for sales volumes of 5,000 tons per year or more; it was about 4% higher than bagged and about 11% higher than bulk solids. In the Pacific coast region, the price of liquid 10-10-10 was about 6% lower than bagged solid 10-10-10 and about the same as for bulk solid. These small differences indicate that specific locations probably could be found where the manufacture of liquid and solid 10-10-10 would be closely competitive, economically, in both regions especially at the larger sales volumes.

Typical estimates of selling prices of 10-10-10 liquid and solid mixed fertilizers are shown in Table IV. The 40,000-ton-per-year sales volume was selected for this comparison because the lowest unit costs for both liquid and solid were obtained for this sales volume. From this table it is seen that, in the South Atlantic region, the advantages of lower operating cost and

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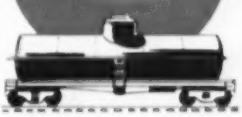

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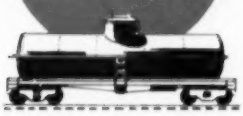

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Table IV. Estimates of Selling Price of 10-10-10 Liquid and Solid Fertilizer
(Sales volume, 40,000 tons/yr.; plants operated 6 mo./yr. to produce 40,000 tons)

Item	South Atlantic region				Pacific region			
		$/ton product				$/ton product		
	$/ton material	Solid, bulk	Solid, bagged	Liquid	$/ton material	Solid, bulk	Solid, bagged	Liquid
Anhydrous ammonia	95.00			3.80	95.00			3.80
Nitrogen solution, 40.6% N	60.00	15.30	15.30		62.00	15.81	15.81	
Ordinary superphosphate	18.00	9.36	9.36		30.00	15.60	15.60	
Phosphoric acid, 75% H_3PO_4	85.00			15.73	85.00			15.73
Urea	101.00			14.95	114.00			16.87
Potassium chloride	37.75	6.42	6.42	6.42	37.75	6.42	6.42	6.42
Sulfuric acid	18.00	1.33	1.33		25.00	1.85	1.85	
Water	0.02			0.01	0.02			0.01
Filler (sand)	3.00	0.10	0.10		3.00	0.10	0.10	
Total raw materials		32.51	32.51	40.91		39.78	39.78	42.83
Operating labor		1.23	1.23	1.20		1.23	1.23	1.20
Maintenance[a]		0.67	0.67	0.17		0.67	0.67	0.17
Electricity		0.40	0.40	0.20		0.40	0.40	0.20
Supplies, 2% operating labor		0.02	0.02	0.02		0.02	0.02	0.02
Analyses		0.20	0.20	0.20		0.20	0.20	0.20
Property tax, 1% plant investment		0.14	0.14	0.09		0.14	0.14	0.09
Insurance, 1% plant investment		0.14	0.14	0.09		0.14	0.14	0.09
Depreciation, 10% process plant and 5% storage investment		1.21	1.21	0.66		1.21	1.21	0.66
Plant overhead, 50% operating labor		0.62	0.62	0.60		0.62	0.62	0.60
Bags and bagging			4.00				4.00	
Total operating cost		4.63	8.63	3.23		4.63	8.63	3.23
Total production cost		37.14	41.14	44.14		44.41	48.41	46.06
Selling expense		3.00	3.00	3.00		3.00	3.00	3.00
Return, 30% of total investment		5.09	5.09	3.92		5.27	5.27	3.97
Selling price, f.o.b. plant, $/ton product		45.23	49.23	51.06		52.68	56.68	53.03
Selling price, f.o.b. plant, $/unit plant food		1.51	1.64	1.70		1.76	1.89	1.76

	Investment cost, $/annual ton	
	Solid	Liquid
Process plant	10.60	4.12
Product storage	3.00	5.00
Working capital	3.35	3.92
Total investment for return	16.95	13.04

[a]For liquid plants: 3% process plant investment plus 1% storage investment.
For solid plants: 6% process plant investment plus 1% storage investment.

Table V. Estimated Costs of Distribution of Solid and Liquid Fertilizers
(Sales volume: 5000 tons; cost delivered to farm)

Item	Bagged solid		Liquid	
	Description	$/ton	Description	$/ton
Labor	4 drivers at $2.30/hr.	1.32	10 drivers, 25% of time, at $2.30/hr.	0.83
Maintenance	5%/yr. of equipment cost	0.09	5%/yr. of equipment cost	0.24
Fuel	Gasoline	0.30	Gasoline	0.19
Supplies	5% of labor cost	0.07	5% of labor cost	0.04
Property tax and insurance	5% of investment	0.16	5% of investment	0.27
Office overhead	50% of labor	0.66	50% of labor	0.42
Depreciation		0.60		1.31
Operating cost		3.20		3.30
Administrative expense		1.00		1.00
Return on investment		1.86		2.55
Total cost of distribution		6.06		6.85
Freight, manufacturer to distributor		4.00		4.00
Total cost delivered to farm		10.06		10.85
Investment		Amount charged to fertilizer		Amount charged to fertilizer
Trucks	Four 10-ton trucks at $6000=$24,000	$ 6,000	Seven 2000-gal. trucks at $10,000=$70,000	$17,500
Storage and office	1 week	20,000	3 days	20,000
Working capital	1 mo. operating cost	5,000	1 mo. operating cost	5 000
Total investment for return		$31,000		$42,500

lower investment cost for liquids were not enough to overcome the disadvantage of higher formulation cost. In the Pacific region, the disadvantage in formulation cost for liquid 10-10-10 was not as great as in the South Atlantic region and this disadvantage was overcome by lower operating and investment costs.

Distribution Costs

In order to make a general comparison of the prices of the several products delivered to the farm, rough estimates were made of the cost of distribution of liquid and bagged solid fertilizers. A breakdown of the estimated distribution costs is shown in Table V. In these estimates it was assumed that the annual sales volume of 40,000 tons would be distributed by eight distributors each handling 5,000 tons of product per year. It was assumed that each distributor would be located 100 miles from the manufacturing plant and would deliver to farms located (on the average) 20 miles from the distribution point. Investment and operating costs for the distributor were prepared in which the distributor was allowed a profit equal to 30% per year of the estimated investment.

The estimates indicate that the costs of delivering fertilizer from the manufacturing plant to the farm would be $10 per ton for the bagged solids and $11 per ton for liquids. For fertilizers of the same concentration, the difference probably is not significant. However, distribution costs per unit of plant nutrient would decrease with increase in concentration of fertilizer. This fact could be important in the choice of process since higher concentrations cannot be attained with liquid mixes because of solubility limitations. Estimated delivered prices of several grades of liquid and solid fertilizers are shown in Table VI.

Table VI. Estimated "Delivered to Farm" Selling Prices for 40,000-Ton Annual Sales Volume
(One manufacturer and eight distributors)

	Estimated delivered price to farm, $/unit			
	South Atlantic region		Pacific region	
Grade of product	Bagged solid	Liquid	Bagged solid	Liquid
1:1:1 Ratio				
10-10-10	1.97	2.05	2.22	2.12
	(1.64)	(1.70)	(1.89)	(1.76)
15-15-15	1.88	...	1.98	...
	(1.66)	...	(1.76)	...
	...	1.99	...	2.03
1:2:2 Ratio				
5-10-10	...	(1.58)	...	(1.60)
6-12-12	1.82	...	2.08	...
	(1.49)	...	(1.75)	...
10-20-20	1.65	...	1.74	...
	(1.45)	...	(1.54)	...
1:3:0 Ratio				
8-24-0	2:11	2.14	2.44	2.14
	(1.79)	(1.80)	(2.12)	(1.80)

Note: Figures in parentheses are prices f.o.b. manufacturing plant. Other figures are prices delivered to farm.

Conclusions

A comparison of the economics of production of liquid and solid mixed fertilizers shows that several factors influence the comparison. In the Pacific Coast region, the economics of producing liquid 10-10-10 appears to be more favorable than bagged solid 10-10-10 and about the same as bulk solid 10-10-10. The relative economics of liquid fertilizers become more favorable as the $N:P_2O_5$ ratio is decreased from 1:1 to 1:3. The relative economics of the solid fertilizers become more favorable as the plant food concentration is increased; for instance, the estimated selling price per unit of plant food of liquid 5-10-10 in the Pacific Coast region is lower than bagged solid 6-12-12, but higher than bagged solid 10-20-20. The higher concentrations cannot be attained with liquid mixes because of solubility limitations.

In general, the economics of liquid fertilizers are more favorable in the Pacific Coast region than in the South Atlantic region. The relative cost of P_2O_5 in superphosphate and phosphatic fertilizer solution is a major factor in determining the relative economics of liquid and solid fertilizers in a given region. The relative economics of liquid fertilizers become more favorable in those regions in which the required provision for seasonal storage of product is small; the study indicated that the investment cost of storage facilities for liquid fertilizers is considerably higher than that for solid fertilizers.

The estimates point out the importance of careful study of market, distribution method, and initial capital costs prior to selection of one process over another. The estimates indicated that specific locations probably could be found in both regions where the manufacture of liquid and solid mixed fertilizers would be closely competitive economically.

Methods of lowering formulation costs or raising concentrations of liquid fertilizers would improve the relative economics of these products. TVA research on liquid mixed fertilizers has included study of methods for delaying crystallization of the more highly concentrated liquid mixtures, use of wet-process phosphoric acid to produce slurry mixtures, use of "superphosphoric" acid (105% H_3PO_4), and use of ammonium metaphosphate to achieve higher concentrations. This research program is continuing.

Acknowledgment

Acknowledgment is made to Mr. P. W. Roden of the Development Branch for assistance in making the estimates.

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'Vermiculite in Agriculture' Publication Available

Vermiculite as a fertilizer conditioner is described in a new publication of the Vermiculite Institute.

This inert, fireproof mineral weighs only 10 pounds per cubic foot, contains less than one per cent moisture, and is non-hygroscopic. It contains about 27½ million particles per pound, is highly absorbent, and is packed in lightweight bags that make for easy handling and storage.

The material is processed in some 40 plants in the United States and Canada.

"Vermiculite in Agriculture" with a special insert for fertilizer manufacturers is available from Vermiculite Institute, 208 South LaSalle St., Chicago 4.

RESEARCH RESULTS & REPORTS

Plant anesthetists should be in demand if the new technique of doping plants with ether becomes general. Michigan State has successfully tested the idea, which operates on the principle that some plants cannot absorb spray fertilizer beyond the leaves. But when the plant is put to sleep—notably a bean plant used in the experiment—the leaf-block relaxes and the fertilizer moves on down to the roots. Of course you can put the fertilizer at the roots in the first place if you choose.

* * *

Liquid Ceresan has been produced by DuPont, which permits more complete seed treatment. They supply it in a variety of concentrations, which retain the advantages of organic mercury's fumigating and residual action, the convenience of liquid and a dye which colors the treated seed.

* * *

More meat per acre resulted in California—125 pounds of it—when the pasture was fertilized, and supplied 126 grazing days instead of 58 on the control fields. The test showed nearly three times as much meat per acre on the fertilized area.

More fruit from chemical applications is growing apace. Not only do tomato seedlings flourish—and subsequently put out more tomatoes, but bigger, heavier blackberries can be produced with plant regulators. The tomatoes flourish on a diet of N-arylphthalamic acids, according to Michigan State researchers; the blackberries at the U of California were as much as 18% larger when treated with a mixture of NOA and PCPA. The anjou pear has increased its yield as much as 60% after USDA experimenters sprayed the trees with 2,4,5-TP and during Apricot Day on the U of Cal campus recently the visitors heard about various plant food regulators applies to their favorite fruit.

* * *

Under beans seems to be the best place for fertilizer, at least that is the experience of an Arkansas farmer. Finding his planter would not put the fertilizer down there, he bought another . . . and when the crop came up you could see the difference at the point he changed planters. The beans with the plant food under them yielded 34 bushels to the acre, as against only 20 bushels where the fertilizer was above and to the side.

* * *

Hydrolized polyacrylonitrile treatment of soybean oil meal produces a combination that is said to both condition and fertilize the soil, provide materially improved germination, grain yield, aeration and water holding capacity. The process is patented — Number 2,741,551 — and licenses are being issued to feed and fertilizer producers.

* * *

Johnson Grass can be controlled by a combination of cultural practices and herbicides developed by H. E. Rea of the Texas A&M department of agronomy. Here's what he says:

"Scattered clumps—five per cent infestation or less; use crown-oiling in cotton and corn—half naptha, half diesel oil and a squirt to each crown, before grass is six inches tall.

"Large spots—6 to 10 per cent infestation; use dalapon spotting in cotton or dalapon-TCA spotting in cotton and sorghums. For dalapon spotting in cotton, use 15 pounds dalapon, one and one-half pounds of dish-washing detergent in 75 gallons of water per acre. Spray tender foilage in spring and summer, leave undisturbed.

"Large spots, each occupying more than two feet of row space—11 to 50 per cent infestation; use dalapon-TCA spotting before cotton, or MH-30 spotting before any row crop; use five quarts MH-30 in 50 gallons water per acre or to thoroughly wet tender foilage. Spray 10 days before planting. Destroy tops of grass at planting or kill them with toxic oil.

"Thick stands—51 to 100 per cent infestation; use TCA to soil in fall, dalapon broadcast before and row crop. TCA to soil in fall; use 50 pounds TCA in 100 gallons of water per acre. Leave alone until after rain. Dalapon broadcast before cotton; use 15 pounds dalapon, two pounds dishwashing detergent in 50 gallons of water per acre. Spray tender foliage one to five days before planting.

Crown-oil surviving grass following any of the above treatments."

* * *

Soil Conditioners is a special report put out by the San Francisco Chamber of Commerce, which says that polyelectrolytic soil conditioners would make useful the remaining 88 million acres of California soil, while now only 12 million are in crop land.

* * *

Lo! the poor plow, we knew it well may be the soliloquy of the future farmer. Out in the Eastern Oregon wheat country they are not plowing under the stubble during the Summer, but letting it stand, controlling the weeds chemically—and thus avoiding erosion from wind and rain. Costs a little more, but seems to be worth it.

* * *

Moisture teams rove Kansas twice a year, taking soil samples and reporting on moisture conditions over a 3,000 mile route.

* * *

Pushbuttons do everything but pick berries on the Van Cleave farm in Oregon. They grow strawberries and caneberries with machines doing the job from start to finish. Even the boysenberry and blackberry canes are removed from the wires by machine. And they finally grind up the canes for plant food. Coil-spring fingers weed plants—and these, plus herbicides, have practically banished the hoe. They mark rows, plant berries, cut off runners—all mechanically and they are working on a speed sprayer.

—BULLETINS—

Maine AES has issued the long-awaited revision of bulletin 469 on Maine Potato diseases, insects and injuries. Write for it at Holmes Hall, U of Maine, Orono, Maine.

* * *

Michigan AES has just issued a reprint of an article on "A Preliminary Report of Investigations of Subsidence of Organic Soils in Michigan" which is interesting largely because it gives the techniques of measurement and recites the problem facing many parts of the US where lowering of surface elevation, due to cultivation, may eventually bring on great areas not fit for cultivation.

Let's Talk **NCI**

■ NORTHERN Chemical Industries Facilities at Searsport, Maine

■ If YOU operate a Fertilizer Plant in the Northeast, use this up-to-date Chemical Center as your own.

■ PRODUCT QUALITY IS GUARANTEED by the BEST of the newest methods.

■ Ample Storage in Rapid Loading and our own Tank Car Fleet guarantee Fastest Service to the Northeast.

Use NORTHERN

- NITROGEN SOLUTIONS
- ANHYDROUS AMMONIA
- SULFURIC ACID
- SUPERPHOSPHATE
- AMMONIATED SUPERPHOSPHATE
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- AMMONIUM SULPHATE 21% N

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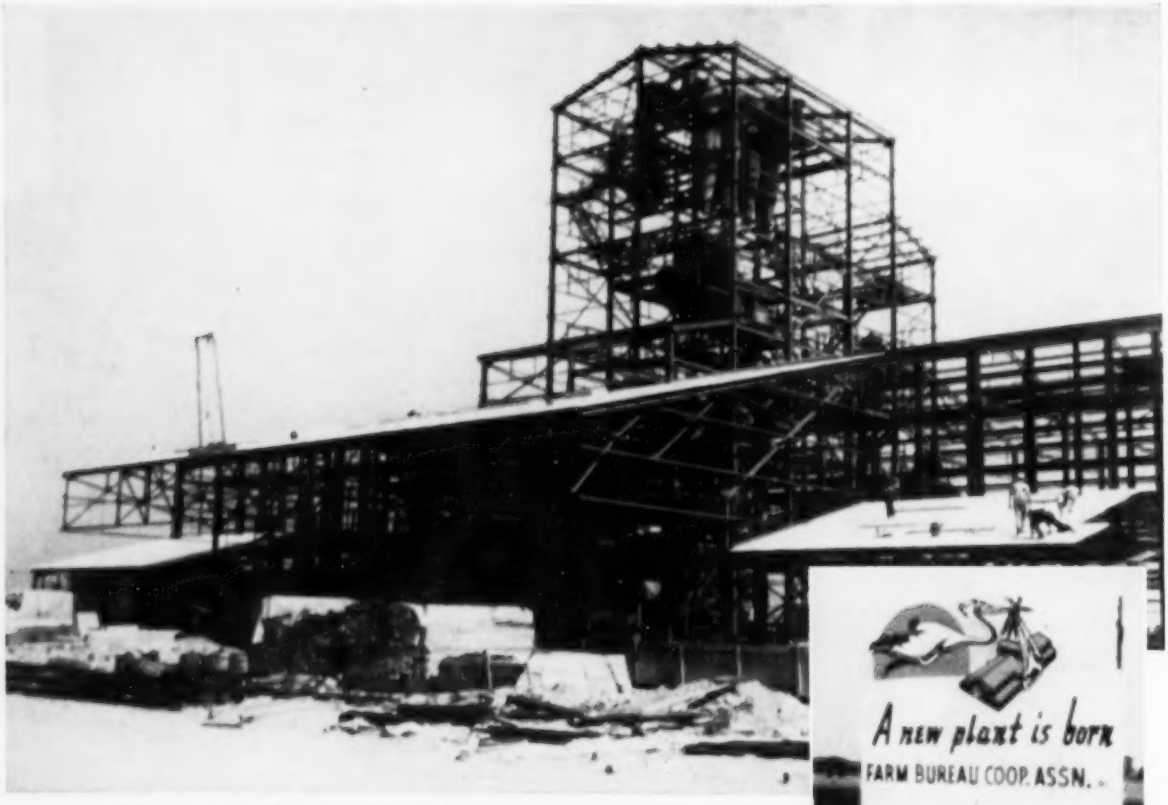


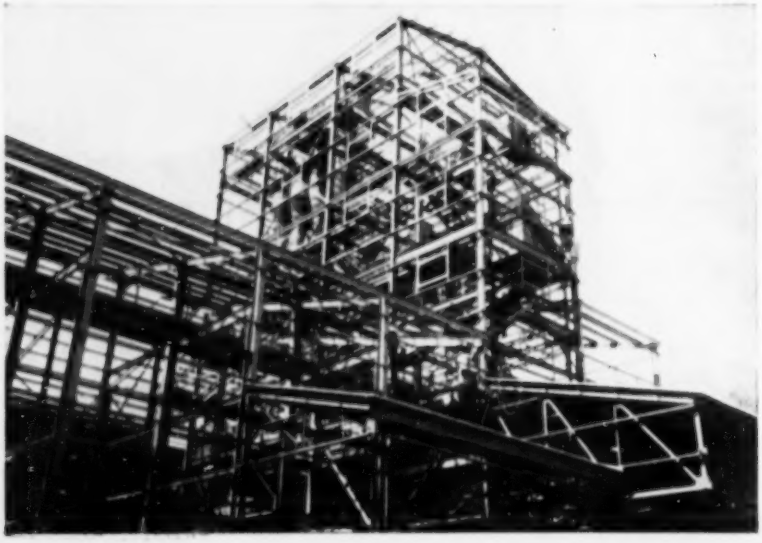
Front view of plant upon completion of steel erection.

Unique construction sign from which the title of this article was borrowed.

"A NEW PLANT IS BORN"

The basic principles of automation, as they presently apply to the production of granular fertilizers, are aptly exemplified in the plant which was recently opened by The Farm Bureau Cooperative Association, Incorporated at Mt. Gilead, Ohio.

Construction view showing upper portion of machinery tower.



This new granular fertilizer manufacturing facility, which has a rated capacity of 70,000 tons annually, was designed, constructed and equipped by The A. J. Sackett and Sons Company of Baltimore, Maryland.

The host of innovations incorporated into this modern plant's production and materials handling facilities were planned with a keen awareness of existing high labor cost standards. All of the plant's operations, including the receiving of solid and liquid raw materials to process or to storage, the compounding, granulating and storing of product, as well as the bulk and package product shipping operations are accomplished at the high-

Exterior view of complete plant.

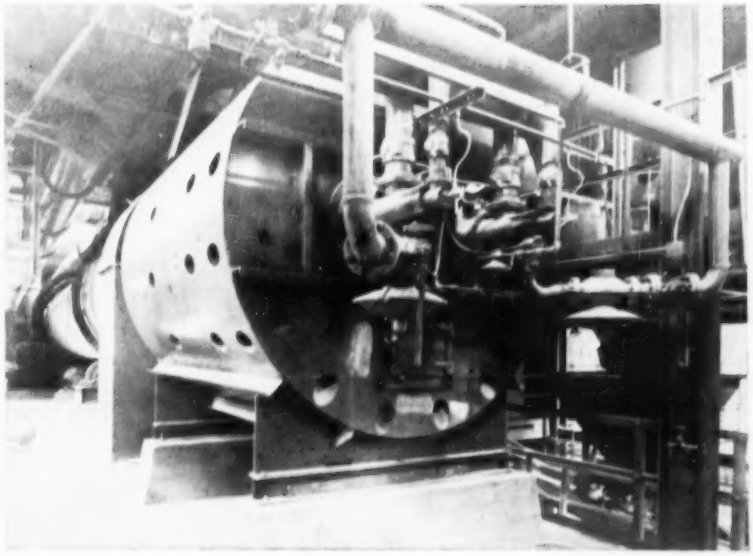
est attainable level of mechanization, resulting in a minimum of manual labor.

Its uncommonly high degree of flexibility and freedom from many of the usual manual operations permit all production activities to be carried on simultaneously and at high speed. Indeed, there are times during the normal operation of this plant when one can observe materials being handled and processed at rates well in excess of 200 tons per hour.

Two independently operated receiving units permit as many raw materials to be transferred from box cars directly to process. One of these units is also provided with an undertrack hopper for unloading hopper bottom cars. Both units are also equipped to take materials to storage bins, if desired.

The compounding and mixing equipment not only does a push-button job of weighing and blending the solid ingredients for direct delivery to the granulating process, but also provides management with a printed record showing the exact weight of each ingredient weighed through the process.

While a Sackett Continuous Granulating Process having a normal production capacity of 30 tons per hour has been provided, means have also been incorporated into the flow plan to permit continuous ammoniation and cooling of non-granular grades at a production rate of 60 tons per hour. Non nitrogen-bearing grades may also be produced at 60 tons per hour.



View of direct heat dryer and combustion chamber with dual gas or oil fired burners.

To insure maximum homogeneity in the finished granular grades, careful consideration was given, during the planning stage, to the preparation and classification of the solid materials blend prior to ammoniation and granulation. This required special screening equipment to be installed in the manufacturing phase preceding the compounding and blending operations.

After being accurately weighed from an elevated eight compartment hopper, the solid ingredients are thoroughly blended through a Sackett Gravity Mixer and conveyed to a continuous weighing machine. This machine supplies a closely controlled flow of the blended solid ingredients to a T.V.A. type continuous deep bed ammoniator, wherein the introduction and mixing of metered flows of anhydrous ammonia, ammoniating solution, sulphuric acid and water with the solid ingredients occurs. The am-

moniator is provided with air blast and exhaust systems.

Upon completion of the ammoniation phase, the material is discharged from the ammoniator to a T.V.A. type granulator. (Note: Plans have been completed for replacing this latter machine with a Sackett STAR* Granulator.) The ammoniator and granulator are each independently operated by variable speed drives.

From the granulator the material is fed to a direct heat con-current type dryer which is provided with automatic controls, refractory lined combustion chamber and fired by two low pressure convertible type burners capable of using either gas or oil for fuel. The dried material then goes to a counter-current type cooler, thence to the final product classifying equipment. This equipment is provided with means for taking the product to storage bins or direct to one of the shipping units.

In this plant the products are packaged by four of the latest type valve packers, the movement of filled bags right onto the bed of the trucks being fully mechanized. Railroad cars may also be loaded for shipment with a minimum of labor.

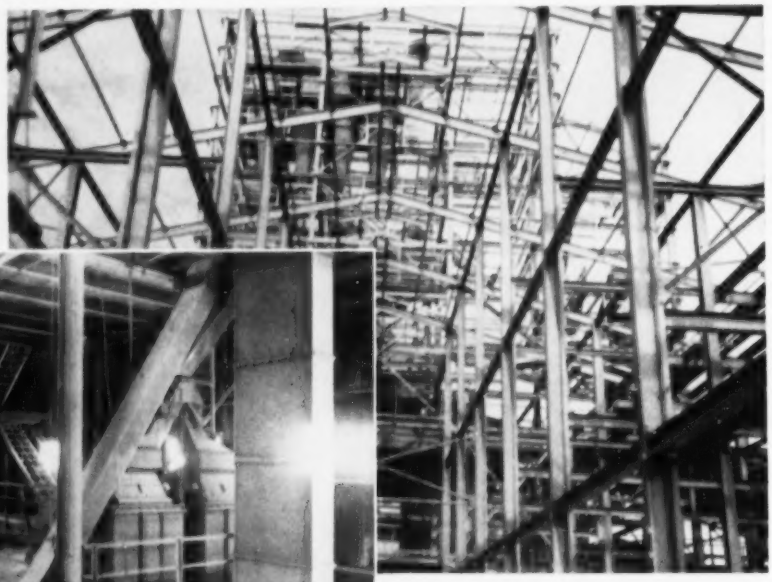
Shipment of bulk products to exact weight specifications are made without the slightest interference with the shipment of packaged goods or to the manufacturing, granulating or receiving operations.

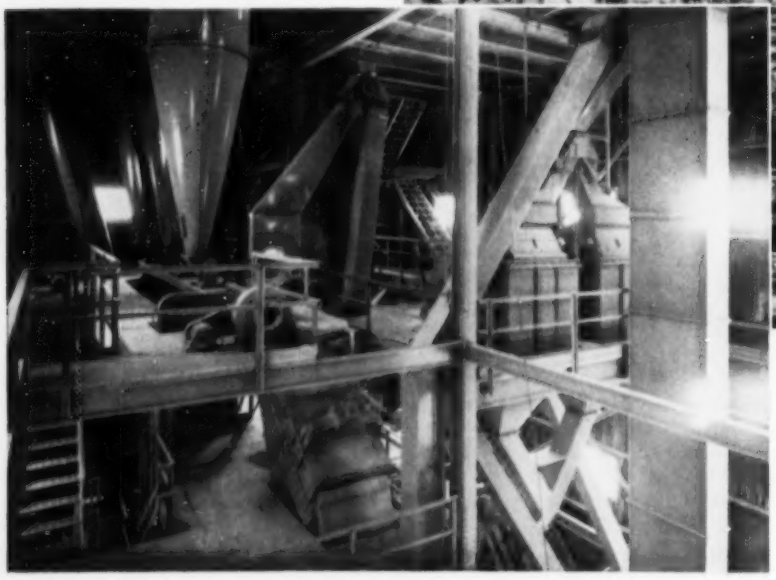
*U. S. and Foreign Patents Pending

Interior view of plant showing materials storage bins.

INTERIOR VIEWS DURING CONSTRUCTION

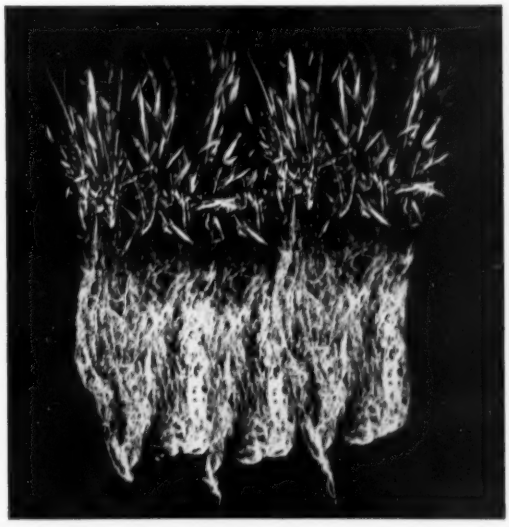
Below, view from longitudinal aisle toward machinery tower during construction.





Left, interior view showing portion of production equipment.

IN WHEAT, POTASH-ENRICHED FERTILIZERS MAKE THE DIFFERENCE



with sufficient potash

without sufficient potash

It's as simple as this—good soil . . . good crops, poor soil . . . poor crops. To insure healthy, bumper crops balanced fertilizers are needed. And it's the potash in these balanced fertilizers that builds resistance to plant diseases, improves quality and yield.

USP's high-grade muriate of potash has the highest K_2O content and is free-flowing and non-caking—important advantages in the manufacture of these modern fertilizers which help American farmers to better crops and better incomes.

HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 60% K_2O MIN.

REG. U. S. PAT. OFF.

UNITED STATES POTASH COMPANY
INCORPORATED
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Southern Sales Office
Rhodes-Haverty Building, Atlanta, Georgia

ALABAMA

Olin Mathieson has announced a $7,500,000 expansion program which will double their electrolytic production of chlorine and caustic soda at McIntosh, vice-president **John O. Logan** announces.

ARIZONA

Southwestern Agrochemicals has awarded construction contract to **Utah Construction** for its $5,000,000 fertilizer plant at Chandler. They expect partial production this year, and completion by March of next year. Capacity is to be 60 daily tons of anyhdrous ammonia, produced from natural gas. **E. C. Harney** is president with **Clyde Wilson** as board chairman. Mr. Wilson is president of the **Arizona Cotton Growers Association,** many of whose members are stockholders.

CALIFORNIA

Best Fertilizers has announced a $1,000,000 expansion of its Lathrop fertilizer plant. President **Lowell W. Berry** says the new unit will turn out 200 daily tons of sulphuric acid.

COLORADO

U. S. Sulphur whose reserves are capable of producing 500,000 tons of the pure product has been bought by **Texas-Adams Oil.**

FLORIDA

Florida Favorite Fertilizer, Lakeland, did not have a fire, as we stated in April. The fire was next door, and the local reporter confused us. We are grateful to **E. F. Murray,** their manager, for correcting the facts.

* * *

Thieves recently took toll of two fertilizer plants recently in the same night in Homestead. **Wilson & Toomer** found their office side door pried off and both office and workroom ransacked. **F.E.C. Fertilizer** had much the same experience. The thieves mostly stole rifles at both places.

* * *

F.E.C. Fertilizer recently won first place in the commercial division of the Miami Flower Show for their display—designed by their sales promotion manager, **Howard Bardsley.**

* * *

Armour Fertilizer's Bartow plant was host to a group of students from he Lake Wales High School chemistry class, which had just completed a study on phosphate and its compounds.

ILLINOIS

Federal Chemical, Danville, has completed the third step of a $1,250,000 expansion program. This has increased capacity 50% and brought it up to a shipping capacity of 100,000 annual tons, according to **F. A. Houk,** sales manager. Federal also has plants at Humboldt and Nashville, Tenn.; Louisville, Ky.; Columbus, O. and Butler, Ind. Latest addition includes a pelletizing plant and a second shipping mill.

* * *

Vermilion Nitrogen Co., Fairmount, is successor to **Vermilion Nitrogen Corp.** The change was made to permit expanded capitalization. **Charles Miller** is president.

* * *

Adams Fertilizer Service has installed two 8,000 gallon anhydrous ammonia tanks at Merna.

LOUISIANA

Dow Chemical is planning a $20,000,000 plant to produce caustic soda, chlorine and several organic chemicals in the Baton-Rouge-Plaqemine area. They have options on two locations; final decision due by June 5.

MISSOURI

Duncan, Dieckman, Duncan Mining Co., St. Louis, of which William G. Duncan is president, have acquired six more manganese bearing claims on Eagle Mountain. These are near the mill site south of Mena, Arkansas in the Ouachita Mountains, bringing the claims owned by the company to a total of 57.

A further statement disclosed the company is about to add a leaching plant to its present facilities for the production of manganese sulphate and manganese oxide.

NEW JERSEY

Allied Chemical's General Chemical division has acquired a 120 acre site in Elizabeth on which it plans a sulphuric acid plant which will run to "several million dollars." It will take raw material from **Esso's** Bayway refinery, produce the acid, and return acid to Esso, and will serve other concerns in the New York area.

PENNSYLVANIA

Sun Oil's new $10,000,000 Marcus Hook plant, reported in operation here last month, was wrecked to the extent of $3,000,000 shortly after we went to press. The main refinery was not damaged, but several units of the new plant were ripped apart and scattered widely by the explosion, whose shock waves were felt for 20 miles.

TEXAS

Phillips Chemical will build a sulphur plant adjacent to the natural gasoline plant now being built by **Phillips Petroleum,** the parent company. P-C now operates two other sulphur plants in West Texas, to feed their plants on the Houston Ship Channel.

* * *

Shea Chemical has completed its Dallas plant's first unit, according to vice-president **J. R. Durrell.** It includes an office building and laboratory space for the chemical control group. This is said to be the first sodium phosphate plant in the South-Central area. The elemental phosphorus will come from Shea's plant at Columbia, Tenn.

* * *

Gulf Oil plans to build up sulphur recovery at Port Arthur, doubling capacity to turn out 280,000 daily pounds from refinery gases.

* * *

Bactex Fertilizer Company has been chartered in San Antonio

with capital stock of 7,500 shares by **William Alter, Sylvan R. Alter** and **Leon A. Tobias.**

* * *

Carl Pool Fertilizers, San Antonio has had three trademarks approved by the Secretary of State: For fertilizers and soil conditioners —Carl Pool, Carl Pool B-R 61, Carl Pool Soil Sul.

VIRGINIA

Virginia-Carolina reports progress on three new mid-West plants. The one at Estherville, Iowa, is now in operation. Those at Remington, Ind., and at Orrville, O., are in the tune-up stage. Estherville will be headed up by **C. Aubrey Clayton** and **Russell S. Wilson.** At Remington, **G. F. "Abe" Flenniken** will be manager, and **W. Leonard Baer,** superintendent. Orrville sales will be handled by **James N. Stone,** with **Thomas P. Rutledge** as superinendent.

All three projects were handled throughout by V-C personnel, from site-choice to engineering to supervision of constructions. All are of gray corrugated asbestos siding with pale green translucent plastic.

Estherville and Remington are equipped for granulation, and all three plants use a batching hopper feeding directly to continuous mixing for both granular and non-granular goods. The modified TVA process is used for granulation in two plants, and at all three regular fertilizers go through a modified TVA process, by-passing the drier.

* * *

C.L.S. Corporation has been formed at Norfolk to produce insecticides, with $25,000 capital. **Herbert Lapetina** is president.

* * *

Farmers Cooperative Fertilizer Purchasers, Inc., Kenbridge, are about to replace the plant destroyed by fire several months ago. They have awarded contracts totalling some $200,000, including a contract for machinery to **A. J. Sackett & Sons Co.** The new plant, when in operation, will have a capacity of 25-30 hourly tons. **W. S. Manson, Jr.,** is president.

WASHINGTON

Crown Zellerbach has announced the start-up of their pilot plant at Camas, which will produce dimethyl sulfide, used as a sulphur carrier. The plant should have an eventual capacity of 2,000,000 annual pounds.

WYOMING

Wyoming Gulf Sulphur has acquired 1200 acres of sulphur deposits in Thermopolis, and has completed plans for a mill that will turn out a thousand daily tons, by fall.

BRITAIN

Dupont has formed a subsidiary **DuPont Co., Ltd.** which represents their first entry ino manufacture in Britain. They plan to have produced their herbicides, "Telvar" and "Karmex" for distribution in the United Kingdom through **Pisons Test Controls,** which is now importing DuPont products. Other products may come later.

* * *

Imperial Chemical Industries, Billingham, has awarded contracts for a $5,000,000 expansion of its fertilizer plant. The new units will include new reaction and granulation plants, and other structures.

CANADA

Pacific Petroleums Ltd., Calgary, and **Jefferson Lake Sulphur,** New Orleans, jointly announced plans to build a $1,800,000 sulphur plant near Fort St. John, B. C. Construction is to start next month with completion scheduled for October of next year. **Eugene Walet** is J-L president; **George L. McMahon** heads P-P.

CHILE

Chile is revamping its nitrate industry, preparing to expand rapidly by the use of a solar evaporation process and much modernization. The Export-Import Bank has been asked for a $25,000,000 loan to handle these developments.

* * *

Anglo-Lautaro Nitrate, largest Chilean producer, has decided to step up expansion of facilities since agreement between government and the nitrate industry has been formally approved.

EGYPT

Egyptian Fertilizer and Chemical is issuing $4,000,000 of new stock to expand ammonium sulfate capacity to 100,000 annual tons. The total installation is estimated at some $9,000,000. A hydrogen supply for the new **Assuan Dam** plant will be assured through construction of a $2,450,000 electrolysis unit, contracted for from Germany's **Elektrometallurgie.**

* * *

Egyptian Chemical Industries will build a nitric fertilizer plant at Assuan, the low bid on which came to 12,277,000 pounds and was made by a Franco-German group including **Uda, Badische Anilinwerke,** and **Schnieder Kuhlmann.** This bid includes all equipment and cost of construction. Minimum production will be 1160 daily tons.

INDIA

Pakistan Industrial Development expects to have its plant completed this month. It will produce 50,000 annual tons for internal consumption.

* * *

Shell Petroleum is awaiting a decision from the Government of India on a proposal to build at Trombay a nitrogenous fertilizer plant which would turn out 225,000 annual tons of ammonium sulphate-nitrate.

ISRAEL

Fertilizers and Chemicals Ltd., Haifa, is connected by rail to Beersheba, source of potash. 100,000 tons of phosphates are expected to move to Haifa this year.

JORDAN

Arab-Jordanian Potash, which has the exclusive rights to exploit Dead Sea materials, has been formed with $13,500,000 capital, to which all six **Arab League** states have contributed some of the money.

KOREA

UN Korean Reconstruction has financed preliminary engineering work on a fertilizer plant near Chungju. The US will contribute $19,500,000 to the needed funds.

MEXICO

Industrias Quimicas de Mexico, Stauffer affiliate, is building a sulphuric plant at Zacapu, Michoacan to turn out 130 daily tons. **Celanese Mexicana** will absorb half the output for rayon use.

* * *

Guanos y Fertilizantes S.A. plans a plant at Coatzacoalcos to cost 200,000,000 pesos, and produce 49,500 annual tons of ammonia, 72,600 of nitric acid, 81,470 of ammonium nitrate and a large quantity of triple superphosphate.

CHANGES

Gulf Sulphur Corp. control has been acquired by **E. J. Hudson,** president of **Hudson Engineering** and the New York investment firm of **Bear, Starns & Co.** they have announced jointly. The price was not mentioned, but they bought more than 50%, and current market value of Gulf Sulphur securities is around $12,000,000. The shares were bought from the **Brady** brothers of Mexico City, and included their minority interest in **Mexican Gulf Sulphur.** Gulf's concessions cover 7,414 acres on the Tehuantepec isthmus, near Mexican Gulf plant—first outside the US to use the Frasch process.

* * *

United States Potash president, **H. M. Albright,** has announced preliminary discussions between officers of his company and directors of **Borax Consolidated Limited** and officers of its American division, **Pacific Coast Borax** with a view to a possible merger of US Potash with a new American company to be established by Borax Consolidated. Such a merger would be accomplished through an exchange of shares whereby the stockholders of the Potash Company would become stockholders in the new American company. In consequence of this step an important American interest would be created in the American securities market for the shares of the merged company.

In this connection, Mr. Albright stated that Borax Consolidated Limited has for many years held a substantial stock interest in United States Potash Company (at one time 50% of the company's common stock), and was largely responsible for financing the development of the Potash Company's mining and refining operations in the early 1930's. Currently the Potash Company is completing a further expansion of its plant at Carlsbad, New Mexico at a cost of approximately $3 million. It has also conducted exploratory operations in the recently discovered potash fields in the Saskatchewan Province of Canada.

Borax Consolidated Limited proposes to transfer to the new American company the greater part of its assets and operations in the United States. A merger would combine these assets with those of the Potash Company. Borax is also presently engaged in an extensive plant expansion in this country and in the installation of an improved method of mining which will result in a much higher recovery from its extremely valuable borax deposits.

H. E. Frederick, vice president, Shea Chemical Corporation heads Shea's new agricultural sales division.

Borax Consolidated Limited has announced that members of the New York financial houses of Lazard Freres & Co., F. Ebersadt & Co. and Lee Higginson Corporation and a representative of the Rockefeller interests have agreed to join the Board of the new American company; that a group of American investors headed by Lazard Freres & Co. will acquire a stock interest of approximately 8½% in the American company; and that provisional arrangements have been made for loans aggregating $16 million to the American Company by an American insurance Company and a group of American banks.

The merged companies would have resources adequate to finance the current expansion program, and the combined assets would provide a broader base upon which to build future growth and development.

Furthermore, a merger would provide a wider diversification of products by the combined companies already established as leaders in two important fields, borax and potash, and would likewise afford opportunities for effective joint research and for bringing about economies in their joint operations. Assurance has been given, in case the merger becomes effective, that the splendid Potash organization would continue to function and that the potash interest would be represented on the Board of Directors of the American company.

The directors of the Potash Company feel that the merger would be mutually advantageous to the stockholders of both companies and have approved it in principle. Mr. Albright says that, although a number of legal and other problems still remain to be solved to develop a complete plan of merger, the discussions have progressed to a point where he and his directors felt that an immediate announcement of the discussions should be made.

* * *

Shea Chemical has consolidated all agricultural sales into a new division which will be headed by vice-president **H. E. Frederick.** Mr. Frederick joined them in 1952 and has been engaged in agricultural activities most of his life. Shea's new furnace at Columbia, Tenn., will bring up their elemental phosphorus capacity to 90,000,000 annual pounds. Their plants for conversion to phosphoric acid are now at Columbia, Adams, Mass. and Jeffersonville, Ind. A new unit is under construction at Dallas, Texas.

* * *

Chemico, the **American Cyanamid** engineering and construction subsidiary, may be sold to **Electric Bond and Share** and would then likely be operated in tandem with **Ebasco Services** which has worked with Chemico on such projects as, for example, **Escambia Bay.**

* * *

Pennsalt's wholly owned subsidiary, **Pennsylvania Salt Manufacturing,** will be merged into the parent company if stockholders approve.

* * *

Nitrogen Division has opened a district office at St. Paul.

* * *

California Spray-Chemical has opened a regional district office in Columbia, S. C.

* * *

Ozark Mahoning has opened a new fertilizer distribution center at Claremore, Ok.

* * *

Integration of **National Container Corp.** into **Owens-Illinois Glass Co.**—subject to stockholders approval—is in progress, according to **Samuel Kipnis,** president of National Container, and **Hugh C. Laughlin,** executive vice president of Owens-Illinois. National Container manufacturers Kraft pulp and board, multi-wall bags, corrugated paper and boxes; owns 28 plants scattered throughout the U. S.

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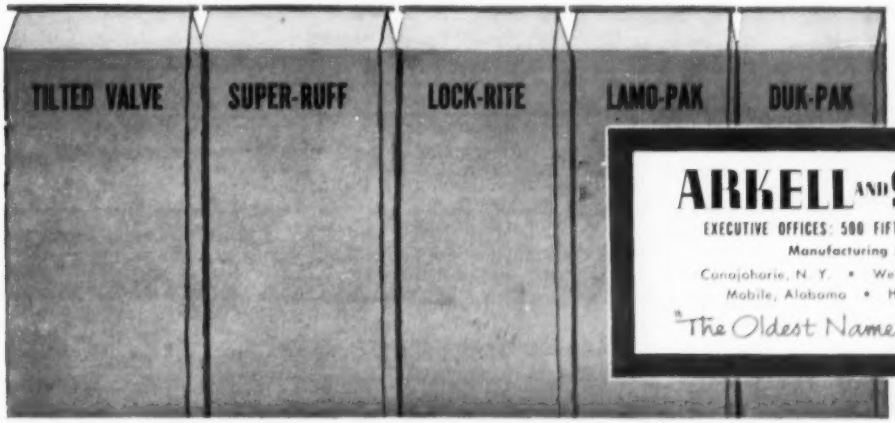

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FLASH FIRES

WHAT LEADS TO THE CAUSES OF FIRES IN FERTILIZER MIXERS

ELMER C. PERRINE,
Technical Representative,
Nitrogen Division,
Allied Chemical & Dye,
presented this paper May 11 at the Governor's Conference on Safety and Health in Baltimore.

Many of the ills that beset mankind are traceable to simple causes. The complexity of this modern age is merely the total of a vast number of contributions each of which was simple to the originator.

An industry advances when the man on the job is shown how to perform his duty safely and it is this approach which we prefer to use. But it is sometimes necessary to first determine wherein lie the mantraps.

When an industry can evolve rules that permit non-chemists to safely bring about complicated chemical actions with the equipment and manpower that exist in fertilizer plants it ill behooves anyone else to arbitrarily substitute "more direct, cheaper, or easier ways."

Perhaps it is an over simplification to state that flash fires in fertilizer mixers are the result of carelessness or more specifically just one more bad result of careless maintenance. Nevertheless a very high percent of them can be attributed to carelessness and to poor maintenance. Faulty design or design that dangerously complicates the operators job has a heavy share of guilt.

Even after the Chemist, the Engineer, and the Metallurgist have fully applied themselves the actual operations must avoid practices that are uneconomical and that are associated with fires.

We may have not unearthed all of the factors that contribute to fires in fertilizer mixers. Careful studies of the operating conditions and the equipment where fires have occurred usually reveal quite glaring irregularities. These irregularities may be deliberate deviations from established practices or they may be the end result of creeping changes from good practices. In addition to the hazard of fires and possible explosions it is costly in the materials of formulation and in other ways to operate in such a manner that fires are a lurking menace.

If the accountant had on the wall of his office a running chart of the cost of operating it is quite probable that he would warn the operator of mounting cost before there was much danger of fires in the mixer. We have seen the cost of mixing increase as much as $16.00 per hour in the materials alone to counteract the influence of disintegrating equipment and these influences were the same that we believe have led to some fires. Some plants are using acid when none is really justified. Some are using it in manners that lose much nitrogen through the action of the acid on ammonium nitrate or through failure to have it reacted with the intended amount of ammonia without there being any offsetting gain.

It is not correct to believe that continuous ammoniators are more prone to flash fires than are batch of other types of mixes. It is more correct to relate them to granulation but even this would unjustly stigmatize that important part of an important industry. It would be more proper to relate these fires to the **IMPROPER** use of sulfuric acid which is used to take up some of the ammonia contained in solutions that also contain ammonium nitrate. We may even add the potassium chloride of most formulae as a factor once the use of sulfuric acid has gotten beyond reasonable control.

Under the bad conditions being described no mixer is immune to these fires.

It is true that sulfuric acid is used with ammonium nitrate solutions in large quantities in the granulation of fertilizer and it is true that continuous ammoniation is a logical part of granulation. If there are more fires in continuous ammoniators it could be so because of the much wider use of sulfuric acid in them than in other mixers.

In many continuous ammoniators air is directed over the surface of the mass that is being ammoniated. This air is then pulled away from the area by a suction fan. Inflammable mixture of air and ammonia could be established in this manner, and this condition could exist over much of the operating time. Even so, this mixture of air and ammonia is not self-igniting. More of the serious fires are probably the result of the use of acid.

Many times in a day an inflammable air-ammonia mixture can be reached in normal operations in batch mixers not using acid, but fires in these cases are practically unknown.

Where a new hazard enters an industry mankind is served best and quickest by finding first the factors that appear in the greatest number of the unhappy instances and then developing reliable, yet simple means of circumventing these influences. Fortunately it is usually quite easy to achieve these ends before wide spread damage is done.

The **MIS-USE** of sulfuric acid which is a perfectly good aid to ammoniation is such a case with flash fires in fertilizer mixers. It is highly improbable that the **well directed** use of sulfuric acid is causing any serious fires. Not even all misuses of acid end up in unpleasant results other than excessive corrosion and other high costs. Practically all cases that have come to our attention were associated with the equipment or operating conditions that were in disgrace with the operator for the reasons that we now believe are also associated with fires.

In this country in one year to about 14 million tons of mixed fertilizer about half a million tons of nitrogen is added through the ammoniating solutions. About half of this nitrogen is from the ammonium nitrate which is included in most ammoniating solutions. About an equal amount of nitrogen is derived from the anhydrous ammonia in them. Most fertilizer is still made

by adding no more ammonia than can be taken up by the superphosphate which makes the use of sulfuric acid generally unnecessary.

The trends towards higher nitrogen content and granulation have led to the use of sulfuric acid to react with that ammonia which is above the capacity of the superphosphate to absorb. This is a logical development and need not be dangerous. If the use of acid becomes dangerous it is usually quite costly before it becomes dangerous.

Sulfuric acid should be thought of as a means of enriching superphosphate for increasing the ammonia take-up just as though the superphosphate had been over acidulated at the time it was made. Serious thought has been given toward this method. When this enriching is performed during the mixing of fertilizer, the time is very short for doing a thorough job. To use this time to the best advantage we believe that the acid should be delivered into the mass of dry materials in such a manner that it is mixed uniformly in the process of delivery and no local area of heavy saturation should be tolerated.

If the ammoniating solution is applied in the same manner there can be no local spots of concentration of either acid or ammonium nitrate, certainly not of both: the combination that is probably the greatest source of trouble.

With the acid applied correctly as above, and the ammoniating solution with equal uniformity, the acid is neutralized rapidly by the first of the ammonia and no free acid could be present to act on any appreciable amount of ammonium nitrate. There should be no more likelihood of trouble here than from the ordinary operations that use no acid at all. Fertilizer by the millions of tons has been ammoniated without addition of acid with no concern over fires in this process. There have been fires in open flame dryers when no acid was used when it is suspected that poor ammoniation created an inflammable ammonia and air mixture in the dryer.

Much rewarding work has been done to improve the distribution of ammonia in the normal mixing process because poor performance in this field makes itself known by very unpleasant working conditions and most managements are sensitive to the high cost of faulty ammoniation.

With the advent of acid it has been too easy to merely add more and more acid to capture the ammonia as equipment degenerated or as the men became careless. Sulfuric acid will not escape into the air as can ammonia, and some of it has no bad or revealing odor; therefore many operators are not aware or do not care when they are using unjustified amount or using it very ineffectively. They are not aware that they may be using acid dangerously. Many believe that it is only necessary to pour the acid into the mixer sometimes through open-end pipes. Some operators have even applied the ammoniating solution first, then the acid; presumably in the groundless hope that the ammonia that has obviously escaped into the air could somehow be reclaimed by that action. To reduce the loss of ammonia the errors are compounded by adding yet more acid when the action that is really required is quick and thorough investigation. The causes are usually quite obvious.

Some are aware of the possibility of fires when sulfuric acid is combined unceremoniously with fertilizer and with ammoniating solutions, but they conveniently believe that trouble could happen only if the acid is of a concentration above 92%. The hazards of fire are usually lessened with the total amount of water increased as through dilute acid, but fires have occurred when 75% acid was used.

With acid used indiscriminately as above in combination with ammoniating pipes that are of poor original design or allowed to degenerate to a low state, we have the settings for possible fires.

The most common fault in **DESIGN** is that which localizes the placement of acid and ammoniating solutions for convenience of installation alone rather than to provide for the actual manufacturing problems.

The most common **DEGENERATION** of good, or bad, equipment is through corrosion that so greatly enlarges the holes of the acid and the ammoniating pipes that all of the distributing pattern is lost. Some pipes that originally did a good job of distributing their liquids over the entire 4 to 6 foot of the mixer in ¼" holes were observed to have the holes so enlarged that all of the liquids must have been pouring out of the first 1 or 2 holes covering only 1 or 2" of the length of the pipe. Some operators become aware of depreciation of equipment only when the pipes are so weakened that they break off in the mixer.

A sketch made with carbon paper for imprinting the exact condition from the pipe is of such a carbon steel distributor pipe badly corroded from 3 months of service. This is from a plant where great care is exercised to protect all personnel and much costly work is done to improve the equipment. As shown by the original drilling pattern at the top it was presumed by the designer that 3/16" holes would do the job in the best fashion. For safe and economical operations quite similar and precise patterns of distribution are demanded of the acid and the ammonia distributing pipes and both may be subject to rapid deterioration.

A chart shows the pattern of density of the mass of fertilizer that contains the superphosphate which is to be ammoniated in one popular type of mixer. (Not the one from which the corroded pipe was taken.) Both the acid and ammoniating pipes should extend the entire length for this particular type of mixer and the drilling pattern should be in accordance with the indicated density of the material in the mixer.

Short distributor pipes and those whose effectiveness has been destroyed by corrosion or by plugged holes are inviting trouble. Ammonium nitrate solutions and sulfuric acid are being combined directly even if unintentionally in such faulty equipment in large quantities.

The action of sulfuric acid on ammonium nitrate in local heavy concentration of both, and more readily with the complications of much potassium chloride, may generate enough heat to start ammonium nitrate burning in the most extreme cases. When it is heat alone that starts the decomposition of ammonium nitrate, about 400 degrees F. is required. Sulfuric acid is often used in granulation beyond the balanced requirements of ammoniation for the sole purpose of obtaining more heat in the early stages than n o r m a l operations would create. Even with equipment that is outrageously inadequate the mass rarely exceeds 220 degrees F. with this practice. These facts leave a very wide margin between safe economical operations and the trouble zone.

As an extreme example of fertilizer practices that can demonstrate the safe handling of large quantities of acid and ammoniating solutions

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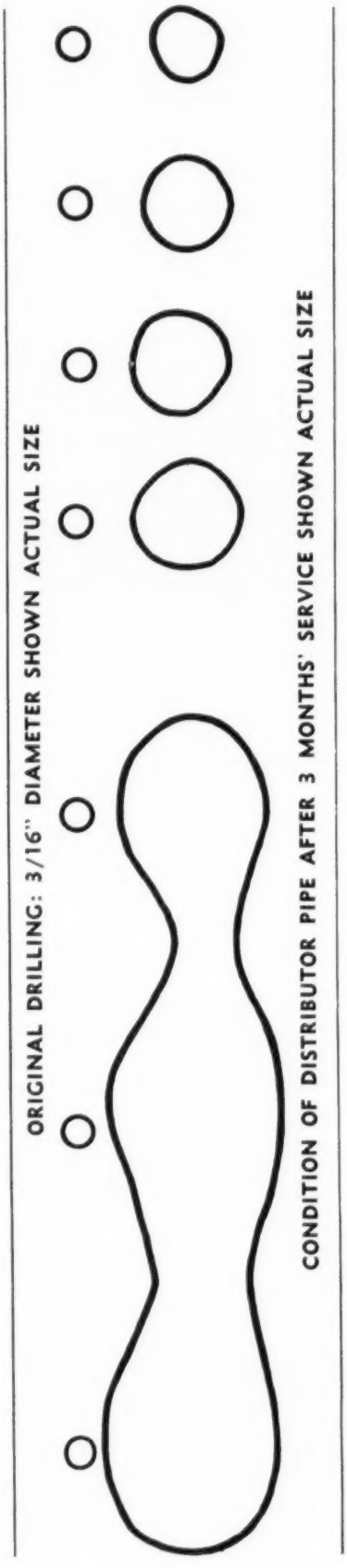

ORIGINAL DRILLING: 3/16" DIAMETER SHOWN ACTUAL SIZE
CONDITION OF DISTRIBUTOR PIPE AFTER 3 MONTHS' SERVICE SHOWN ACTUAL SIZE

in the same formula the 10-10-10 granulated fertilizer is a good case. It is a frequent and acceptable practice to derive all of the nitrogen from ammoniating solutions in this formula. From 125 to 150 pounds of sulfuric acid can be justified and this is added to the dry mass which totals around 1365 pounds of which 335 pounds, or about one fourth, is potassium chloride.

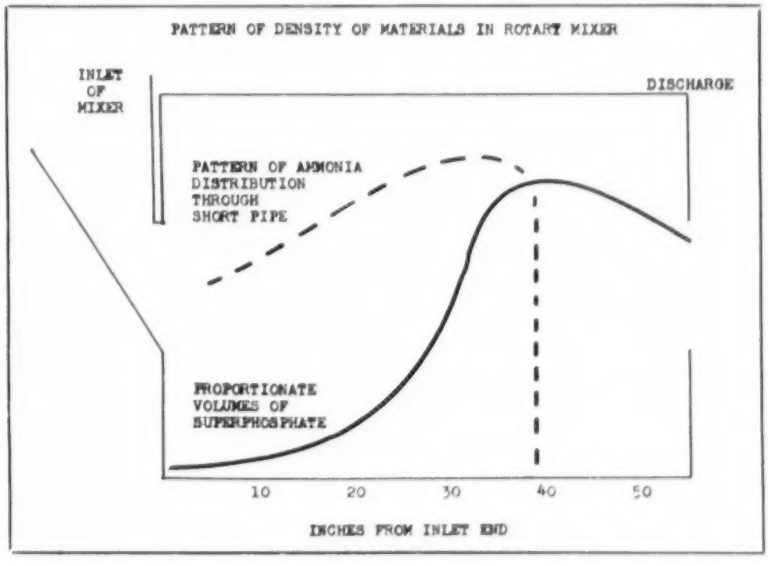
The slightest mixing ahead of the addition of acid should eliminate any concentration of potassium chloride. If the acid is then dispersed even remotely as suggested for good practices, there can be little action of acid on potassium chloride. The first 50 pounds of ammonia that will neutralize this amount of acid is applied within 10 or 15 seconds of the distribution of acid. Only 140 of the total 300 pounds of ammonium nitrate in this extreme case will have been added through the ammoniating solution by the time all of the acid is neutralized in any reasonably good equipment and techniques. These are some of the very simple reasons why very large amounts of both ammonium nitrate in the solutio nand sulfuric acid are used successfully in practically all of the plants that are engaged in this type of formulation without any trouble from fires.

It is good economics to do the job right and that happens also to be the safest way. Using large amounts of these two excellent materials is dangerous only if the original sin has been committed; that of very faulty distribution of them throughout the mixture. These facts should be enough to encourage the very best of design, operating techniques and maintenance.

Where ammonium nitrate bearing ammoniating solutions were mixed direct with acid in equipment that was even designed by reputable engineers for this specific purpose there has been at least one very serious explosion. The layman has no business mixing these two materials directly by intention or by default through improper equipment or techniques.

You do not have to seek very far afield to study some interesting cases of fires. In one batch plant the operator was applying sulfuric acid and ammoniating solution simultaneously as the dry materials slid into the mixer. The two distribution pipes were in good condition and of quite good design. The trouble here was from operating technique. Later an experiment in this plant required the installation of an ammoniating pipe that was of adequate design and the entire mass was in the mixer before applying the ammonia. No acid was used in the experiment, mixing was speeded up, and more ammonia was taken up by the superphosphate alone than was formerly absorbed by the acid and superphosphate. Fortunately the efficiency and economics of good operation were demonstrated before any damage was done. When, and if, this plant returns to the use of acid, it will probably be done the safest as well as the most economical and pleasant way.

One continuous mixing unit had been using a very great excess of sulfuric acid through the meter as revealed by the unexplained low



level of the supply tank. There were frequent fires here even though the equipment other than the meter was in excellent condition.

Most operators have delivered ammoniating solutions into empty mixers and only ammonia fumes resulted. Bad fires have resulted when acid was included in the mistake. The results are probably worse with poor distributor pipes but every effort must be made to avoid such errors with even the best equipment.

There is one unusual set of conditions in continuous operation associated with fires in fertilizer mixers that points out the need for alert skills in operation, and these conditions are not related to faulty design or maintenance. When the TVA type of continuous mixer is functioning properly for ammoniation, the mass in the mixer that is adjacent to the shell is transported upward to the radial position that conforms to the top level of the angle of repose of the mass. As the rotation continues to lift this portion of the mass beyond the angle of repose, the material rolls down the inclined face of the mass to the bottom. It is this continuous turbulence that makes possible the satisfactory ammoniation that is being effected in these mixers.

Under some physical conditions the mass remains virtually inactive and the entire bulk merely rocks slightly upward and slides back down without any inner or surface turbulence. If the operator does not quickly correct this condition or reduce or stop the flow of acid and ammoniating solution, the result is essentially that of adding the two products together directly in considerable quantities. Some fires in continuous ammoniators have been attributed to these conditions.

The fertilizer plant operator is well advised to reappraise his equipment and techniques with the aim of preventing any bad conditions from existing. It is amazing how many operators are approximating these bad conditions for trouble by not knowing the state of repair and conditions of operating his equipment, or, if aware, is not concerned about the possible consequences.

In continuous ammoniating and the continuous addition of acid faulty conditions can also develop through abrasion which may wear holes in the ammoniating and acid pipes near enough the same locations to create faulty mixing conditions. The TVA engineers have made exhaustive studies on the continuous ammoniating pipes. Their design for applying acid shows clearly that they also realize the need for avoiding the things we point out here for batch mixes. We refer to batch mix operations often in this discussion merely because the principles are easily illustrated in them.

Sulfuric acid in the presence of moisture and the heats involved is very corrosive to ordinary carbon steel as are also some ammoniating solutions. Even the more popular stainless steels are corroded by the products in this operation.

The great difficulty of installing and frequently inspecting the all-important distributor pipes in some mixing machines undoubtedly contributes much towards poor maintenance.

In summary, the pitfalls of flat statements are known but the ability of a system to handle ammonia without the aid of acid may be one good indication among several of its ability to handle acid safely, but some standards must be defined for judging the systems. Only the most capable equipment and personnel should be trusted with the use of acid.

Without acid or ventilating systems, or bad fumes, a unit of P_2O_5 in 20% superphosphate is being made to take up 6.0 or 6.5 pounds of neutralizing ammonia at essentially 100% retention of input applied in 30 to 40 seconds. Triple superphosphate of fine particle size will take up about half this amount of ammonia per unit.

For neutralizing ammonia take-up alone it should not be necessary to use any acid below these rates.

No more than 3 pounds of sulfuric acid should be included for each pound of neutralizing ammonia in the formula that is above the amount that should be taken up in the superphosphates.

The use of any sulfuric acid beyond these requirements is not only costly but may indicate possible dangers and should inspire immediate and thorough investigation of design of equipment, operating techniques, and state of repair of equipment.

If acid is added to the dry materials first and distributed uniformly about as required for fast high rate ammoniation, the minimum of acid would be used to its fullest efficiency and there would be little cause for concern.

The test with unaided high rates of ammoniation may be one way of testing fitness of systems as cold water pressure tests have been used to test steam boilers.

Every effort should be made in the design of equipment, maintenance, and operating techniques to avoid any local heavy concentrations of either ammoniating solution or acid. This is only good ammoniating practice added to acid application. It is economical, really quite simple, and should reduce very greatly the hazards that are too common now. Frequent rigid inspections are necessary.

The days are gone when relatively inert materials were thrown together to age for weeks in large bins. Even then many plants burned down from actions in the piles, slow as these actions were.

Things happen fast these days, but the demands that make operations relatively free from fires in fertilizer mixers are very reasonable and the rewards for conformance are very great.

The eternal vigilance that is the price of peace should be directed toward more correct design of equipment, its maintenance and its proper use.

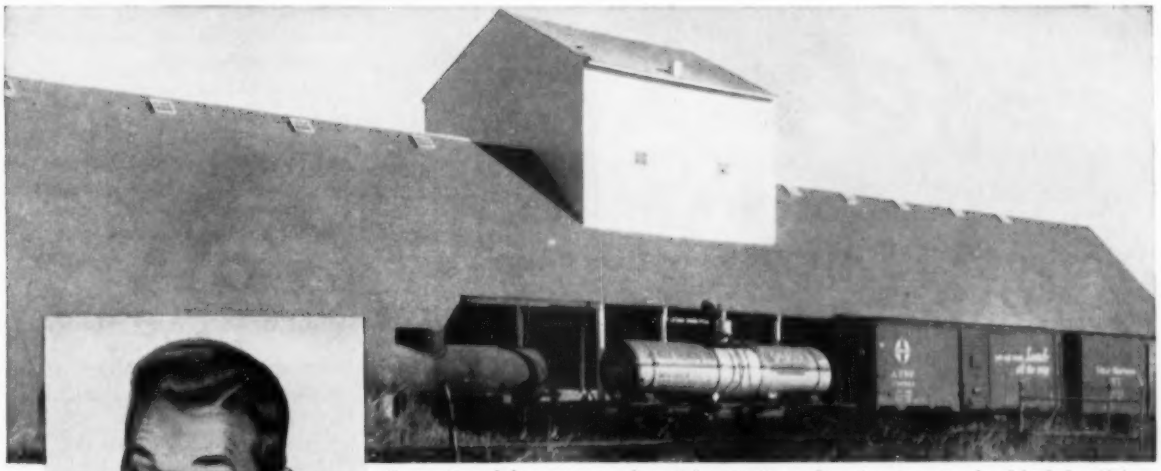
Burlap Councils Shows New Uses for Burlap Bags

An interesting booklet has been published by the Burlap Council, 155 East 44th St., New York 17, N. Y., much of which comes straight from the farm, where the ingenious uses the farmer has made of these bags is highly praised by the Council. "Give him (the farmer) a burlap bag" they write "and there's no end to the clever things he can do with it."

The folder illustrates and describes such uses as windbreaks to stop snow drifting; closing in around the open area under buildings raised above the ground; wrapping pipes in winter; making rubbing bags containing pesticides for pigs; keeping lambs warm in winter and cool in summer; to get your car out of the mud. You get the idea . . . maybe you'd like a copy, and they'll be glad to send you one if you will write them.

Ehrsam Buys Foundry From Morse-Koob

J. B. Ehrsam & Sons Manufacturing Co., Enterprise, Kansas, have bought the foundry of Morse-Koob, Inc., Wichita, and are now operating under the name of Ehrsam Wichita Foundry, Inc. Ehrsam has been making grey castings for 82 years and has a world-wide business.

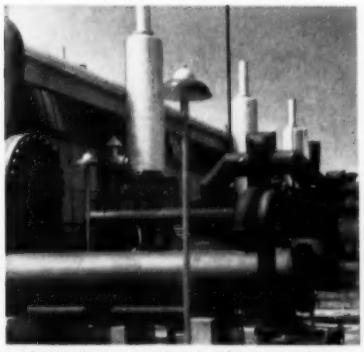


Robert M. Harding is president of Valley Fertilizer Company.

Operating labor was reduced by 50% and output was doubled in this plant when a continuous ammoniating system was installed by Valley Fertilizer Co. last year. Located in Greenville, Miss., the plant serves a 100-mile radius, and operates a government-approved soil testing lab. under the direction of a graduate agronomist. The company makes and distributes Green Valley Brand Fertilizer.

Another Spensol User . . .

Valley Fertilizer Company



Here is some of the modern equipment used by Spencer to produce SPENSOL Nitrogen Solutions for some of America's leading fertilizer mixers.

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America's Growing Name in Chemicals

Safety

AMERICAN POTASH & CHEMICAL HAS ELABORATE FIRE SAFETY PLAN

The industrial safety program in effect at the Whittier, Calif., research laboratories of American Potash & Chemical Corporation was augmented recently to include a course in emergency fire fighting.

Purpose of the course was to acquaint research employees with methods of fighting fires and proper handling of auxiliary equipment, such as gas masks, until the arrival of professional fire-fighting crews.

The course is an example of the stepped-up safety program not only of AP&C but of industry in general to lower accident rates during working hours.

The corporation's long-range safety studies were accelerated about six years ago in its various facilities located at Los Angeles, Whittier and Trona, Calif.; at Henderson, Nev.; and at its subsidiary, American Lithium Chemicals, Inc., at San Antonio, Tex.

The outstanding result of the stepped-up program was the company's being awarded the Lammot du Pont Safety Plaque, the chemical industry's highest safety award presented annually to the company showing the greatest improvement in plant safety over a five-year period.

More recently, the company's Los Angeles plant completed two years without a lost-time accident. In all, American Potash & Chemical Corporation and its various divisions received nine awards for safety during 1955, while it has received two so far in 1956.

The fire-fighting forum at the company's Whittier Research Laboratory was arranged by the lab's safety committee in cooperation with the Whittier Fire Department, under the direction of Chief A. B. Alford.

Whittier Assistant Fire Chief C. W. Stephenson conducted lectures and demonstrations, including question-and-answer sessions.

Following this, each of the lab's technical personnel put out a controlled gasoline-and-oil fire with a dry chemical fire extinguisher.

Employees also were instructed by Capt. C. O. Johnson on the proper method of donning and adjusting two types of gas masks for varying emergencies.

Additional sessions were planned in fire drills and other aspects of fire-prevention and fire-fighting to add to the lab's safety program, which includes frequent inspections by division heads and unannounced checks by lab personnel.

Lion Oil Plant Wins Safety Trophy

For achieving a new company safety record, the El Dorado chemical plant of Lion Oil Company, a Division of Monsanto Chemical Company, May 4 was presented Monsanto's General Manager's Trophy.

J. B. Rogerson, Lion vice president for manufacturing, engineering, and development, accepted the award from Francis J. Curtis, Monsanto vice president for personnel. Rogerson in turn presented the trophy to A. M. Sprague, manager of the chemical plant. George L. Gorbell, Monsanto manager of safety and fire protection, introduced Curtis. Roy White, Lion supervisor of personnel, safety and plant protection, presided at the meeting which was attended by more than three hundred employees.

The trophy is traditionally held by the Monsanto plant which has accumulated the greatest number of continuous man-hours without a lost-time accident. It will be displayed in the administration building of the chemical plant.

As part of emergency fire-fighting course at American Potash & Chemical Corporation's Whittier, Calif., Research Laboratory, Whittier Assistant Fire Chief C. W. Stephenson (right) explains that indicator on self-sustaining gas mask shows how much oxygen remains in the cylinder on the back of subject. Wearing the mask is Robert Washburn, senior research chemist, while Winston Walker, laboratory technician, looks on. Right, Dr. David Stern, head of the Electrochemistry Section at American Potash & Chemical Corporation's Whittier Research Laboratory, moves spray steadily across pan as fire comes under control and thus puts out remaining part of blaze.

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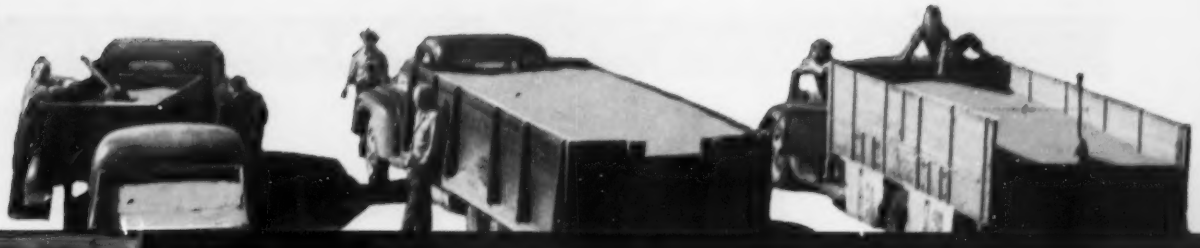

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NITROGEN THE HEART OF THE HARVEST

Personals

Barney A. Tucker, general manager of **Knoxville Fertilizer** and **Dean Planters Warehouses,** and president of the **Kentucky Chamber of Commerce** and a whole long list of other honors and titles, was in the news recently when he presented the check to a winner of a 1955 Community Development Contest—the prize being sponsored by his company. One of Barney's titles, by the way, was state chairman of the Community Development Committee.

* * *

P. J. Reno who has been for the past six years manager of **Hercules Powder's** Dallas office has been made sales manager for the crop chemicals division of their naval stores department. He will be replaced in Dallas by **Allen C. Gunter.**

G. Burke Garrette announced as a southern sales representative of U. S. Potash. He will work out of the Atlanta office under the supervision of L. Ralph Boynton, Southern sales manager.

* * *

Olin Mathieson, which plans the manufacture of fertilizers, chemicals and pharmaceuticals in Africa, in conjunction with **E. R. Squibb,** has appointed **R. Neesham** to be their representative in Johannesburg.

Bob Little has become manager of O-M headquarters in Walla Walla, Washington, location of one of the Geigy plants they recently purchased.

* * *

H. E. Treichler, general consultant to **Pan American Sulphur,** has been made a director.

* * *

Dean R. Gidney, vice president and sales manager of **U. S. Potash** has become a director.

* * *

G. L. Jackson has been elected to the board of **Coastal Chemical,** the new Gulf Coast organization sponsored by **Mississippi Chemical.** MCC has elected **W. E. "Bill" Barksdale** executive assistant. He has been public relations director for **Alexander Smith,** Greenville.

* * *

Kerby H. Fisk, director and financial consultant, has been made chairman of the finance committee of **Allied Chemical & Dye,** succeeding **Eugene Meyer,** who continues as a member of the committee.

* * *

Lewis R. Sanderson has retired as president of **National Gypsum,** and has been succeeded by **Fred A. Manske,** executive vice president. **Wells F. Anderson** has been elected a director and elevated to the rank of senior vice president from that of operations vice president. **Melvin H. Baker** continues as chief executive officer of the company.

* * *

Frank Sanders has been appointed manager of **Southwestern Fertilizer and Chemical,** El Paso.

* * *

Dr. C. C. Rolland has become chief development chemist, and **William Prescott** chief analytical chemist of **American Cyanamid's** Fortier plant, according to plant manager **C. F. Bonnet.**

Donald T. Fangmeyer who has been appointed general sales manager of Northern Chemical Industries, is a native of Baltimore, has held various sales positions with Olin-Mathieson Chemical Company, the latest of which was manager wholesale sales of their Eastern Fertilizer Division. He comes to Northern well qualified for his work in promoting their sales of anhydrous ammonia, nitrogen solutions, sulphate of ammonia, superphosphates and liquid alum in the Northeast area including Eastern Canada. His headquarters, effective June 1, 1956, are at N.C.I.'s Searsport, Maine plant.

* * *

Escambia Bay Chemical Corporation has elected **R. U. Haslanger,** vice president and general manager, to the board of directors.

Mr. Haslanger has announced the appointment of **A. N. Wohlwend** as director of commercial development. Prior to his association with Escambia Bay he was with **Stauffer Chemical** in a similar capacity.

The company produces ammonia and nitrogen fertilizer materials at its Pensacola, Florida plant.

Harnischfeger Corporation, Milwaugee, announces the appointment of **G. W. Bowman,** with them since 1939, as salesmanager, hoist division; **F. A. Liebich,** with them since 1924, as Cleveland district manager, industrial division.

* * *

W. D. Payton has been named plant superintendent of Coulee ammonia plant now being built near Kennewick, Wash., according to **K. S. Adams,** chairman, and **Paul Endacott,** president of **Phillips Petroleum Company** and its wholly owned subsidiary, **Phillips Chemical Company,** operator of the plant. **Phillips Pacific Chemical Company,** which is building the plant, is jointly owned with **Pacific Northwest Pipeline Corporation.**

The Coulee plant is scheduled for completion late this year, and Mr. Payton will be visiting the site periodically while the plant is under construction.

* * *

New corporate officers of **Brea Chemicals, Inc.,** subsidiary of **Union Oil Company of California,** were announced by **Homer Reed,** president,

M. G. Woodward, treasurer and controller of Southern Nitrogen Company, Inc., who has been elected a director of the firm, John R. Riley, president, announced May 5. Southern Nitrogen is presently constructing a $14,000,000 petro-chemicals plant at Savannah, Ga., to produce, in early 1957, 250 tons per day of ammonia used to make nitrogen solutions and ammonium nitrate for fertilizers.

as follows: vice presidents—**Robert S. Ray,** manager of manufacturing; **Jack Tielrooy,** manager of development; secretary and treasurer, **Paul Foreman,** formerly secretary and manager of staff; comptroller, **W. W. Philips,** formerly assistant comptroller; assistant secretary and assistant treasurer, **Jay Linderman,** formerly assistant secretary; assistant comptroller and assistant treasurer, **William C. Van Siclen.**

* * *

Appointment of **Kenneth D. Morrison** as vice president of **Philipp Brothers Chemicals, Inc.,** was announced by **S. Bendheim,** president. He was previously general manager of the agricultural chemicals division.

* * *

Rune E. Swanson has been appointed controller of **International Minerals & Chemical Corporation,** Louis Ware, president, has announced.

Mr. Swanson will make his office at International's headquarters in Chicago and will report directly to **Arthur R. Cahill,** vice president in charge of the corporation's financial division. **Max H. Forster** has been appointed to the newly-created position of management development supervisor.

* * *

Three new staff appointments in the chlorinated products division of **Diamond Alkali Company** were announced by **Loren P. Scoville,** general manager of the division.

Dr. M. J. Skeeters, acting manager of research since June, 1955, becomes manager of research with responsibility for the division's research, development, and sales technical service program.

Alex Hlynsky is named divisional group leader for research, the post in which he has been serving since last June. He will continue to be concerned primarily with research on organic chlorinated compounds.

Robert J. Orlik, a member of the divisional administrative staff since May, 1955, takes over the assignment of sales promotion representative for agricultural chemicals. He will coordinate various sales activities at Diamond's home office with those of its branch sales offices.

* * *

The appointment of **C. O. J. Wheeler** as manager, traffic department has been announced by **C. M. Powell,** president of **The American Agricultural Chemical Company.**

Paul Staub, recently announced as Pacific Northwest district sales manager for American Potash & Chemical Corporation. He will operate out of Portland, Oregon, and will cover Oregon, Washington, Idaho, Montana, Wyoming and British Columbia.

Rod Taft who was recently transferred from Los Angeles offices of American Potash & Chemical Corporation to company's newly-opened office at San Francisco. Taft, previously supervisor of potash sales for the chemical firm, becomes district sales manager, handling sales in northern and central California, Nevada, Utah and Colorado.

F. M. "Bud" Chester who has been promoted to vice president and plant manager of Schelm Brothers, Inc., East Peoria, Ill., it was announced by president W. H. Schelm.

R. Seth Bostick has been made salesmanager of the White Bag Company, Spartanburg, S. C., according to president John B. White. Mr. Bostick has been actively in the paper and paper bag business for the past 12 years.

St. Regis Paper Company announces the appointment of **Clyde C. Stinebiser** as branch manager at the company's new multiwall bag plant at Kansas City, Missouri. St. Regis will move into the plant about June 1, 1956. Mr. Stinebiser previously was a superintendent at their Pensacola, Florida multiwall bag plant. **Don R. Russell** is now sales representative of the multiwall packaging division in the Minneapolis, Minnesota office, located at 206 Foshay Tower. Mr. Russell was formerly a St. Regis sales representative in Cincinnati, Ohio.

* * *

W. C. Varey has been made representative for **Arkell Safety Bag Co.** in Maryland, Delaware, the Eastern Shore and Virginia.

* * *

Henry L. Pierson has been appointed vice president and secretary of **Freeport Sulphur Co.,** New York.

* * *

Folke Becker, board chairman of **Rhinelander Paper Company,** has been elected a director of **St. Regis Paper Company.** He fills a vacancy created by retirement of Carl B. Martin from the board.

* * *

B. J. Phillips has been appointed sales representative for the Southeastern sales territory of Coronet Phosphate, working out of Norfolk on their CDP.

* * *

George W. Lucas has been appointed to cover the New York City and New Jersey territory for the flexible packaging division of Arkell and Smiths.

* * *

David L. Rawls is sales manager and **Robert L. McCormick, Jr.,** is assistant sales manager of the **Dixon Chemical & Research** Philadelphia office.

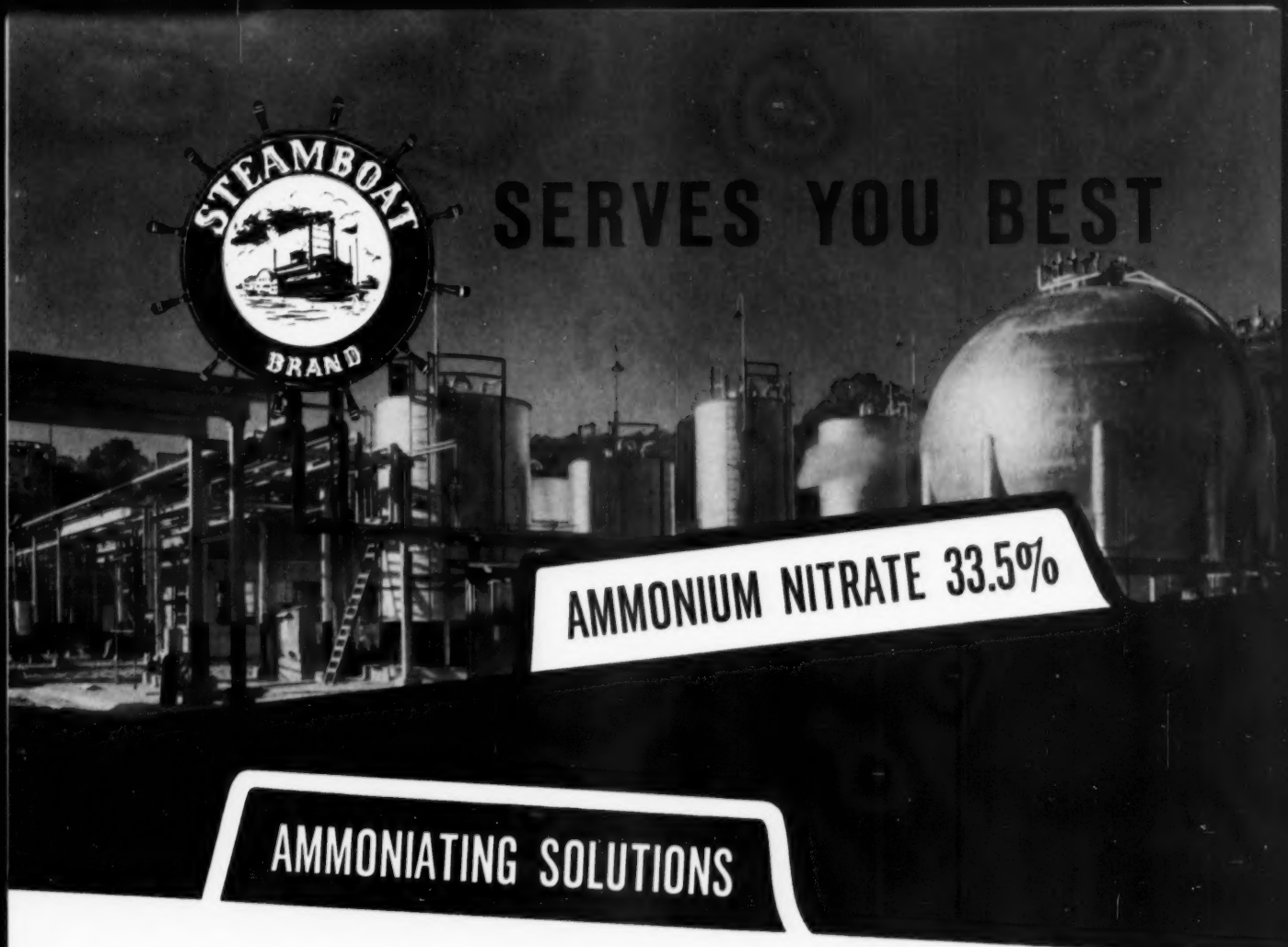
* * *

Lee S. Ralph has been made salesmanager of **Chase Bag's** St. Louis branch.

* * *

W. Roberts Wood has been elected president of **The Girdler Company,** Louisville, Ky., a division of the **National Cylinder Gas Company,** Chicago.

Mr. Wood succeeds **George O. Boomer,** who retired as Girdler's operating head. Mr. Boomer will continue as chairman of the executive committee of the National Cylinder Gas Company.



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Plan To Solve Farm Surplus Problem Offered By Ad Agency Executive

A revolutionary new plan to master the nation's number one domestic problem, the farm surplus, was described by its creator, John S. Williams, senior vice president and director of Cunningham & Walsh, New York ad agency. Essence of the plan is to sell this surplus both here and abroad by a large-scale use of the modern advertising and marketing techniques that have made the United States the world's greatest merchandiser.

Williams told members of the National Newspaper Promotion Association that farm surplus had cost U. S. taxpayers over 22 billion dollars in the past three years, and that storage costs alone were more than one million dollars a day.

Williams said that the problem of selling farm commodities held by the government was essentially the same as selling an inventory excess for a business organization. The only difference would be one of degree, he pointed out. Farm surplus, piling up at a rate of over nine billion dollars annually, would require market analysis, advertising, and merchandising promotion on a broader scale than hitherto required by even the nation's largest industrial producers, he said.

Williams stated that although each successive government administration had greatly extended the scope of its business operations, practically no use had been made of advertising and marketing practices accepted as vital by private business organizations. He pointed out that the federal government's total advertising outlay in measured media last year was only $200,000, as compared to budgets of $90,000,000 or more for a single private enterprise.

Williams proposed that the government establish a Farm Surplus Marketing Commission, set-up on a non-political basis similar to the Atomic Energy Commission. This Commission would select advertising agencies on a competitive basis, in the same way as a prospective client chooses an agency. Each agency would be given an advertising appropriation for a specific surplus commodity, such as butter, wheat, corn, or cotton. The agency would then study both domestic and foreign markets, develop new outlets, create new uses for the commodity, and then promote it and advertise it. In recent years, the advertising agencies have accomplished this feat again and again, with such products as frozen foods, concentrated fruit juices and many other products, he said.

Williams said that there was no danger that his plan would create an unfair competitive advantage for government held commodities over privately marketed ones. He pointed out that although nominal competition would exist, experience in the past shows that such competition had extended commodity markets rather than constricted them. On the other hand, he said that the government's policy of limiting farm production was inherently detrimental to the nation's full economic potential.

Williams stated that the farm surplus problem was creating other and equally serious side effects. For example, a reduction in farm machinery manufacture and sales; loss of government income in the farm belt; and impaired purchasing power of farmers. This situation is causing growing resentment not only among farmers but with the nation at large, he said.

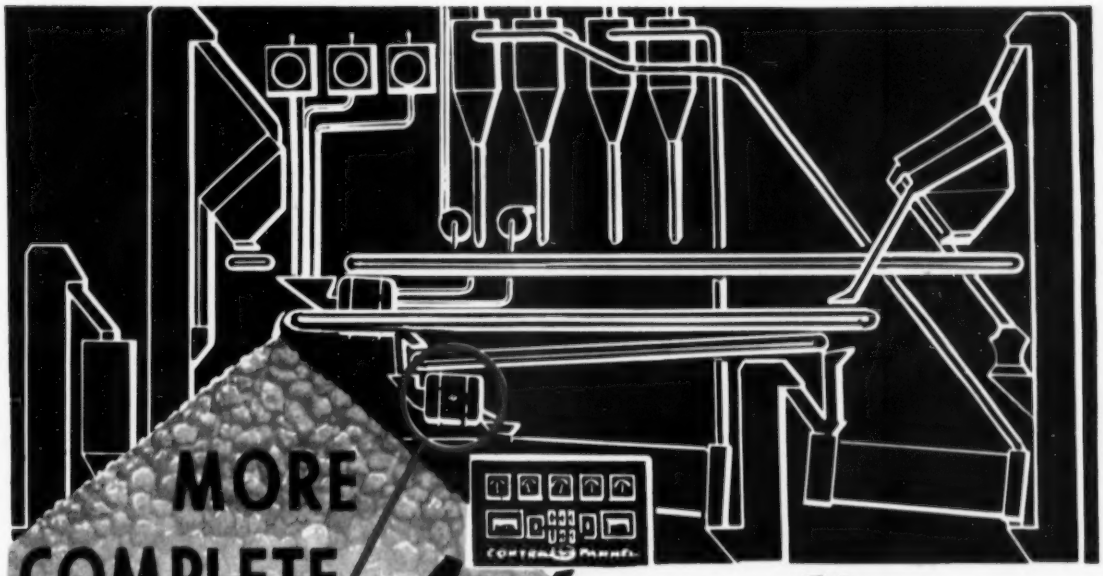
Editor's note: C.E.D. in a recent bulletin pointed out that surpluses either in the hands of the government or under government loans cost $300,000,000 a year just to store. They point out the complete failure of production controls to check the growth of surpluses.

"Satisfactory solutions for agriculture's problems can be found only if the nation maintains high and growing levels of income and employment" the committee said. "A satisfactory farm price policy must retain as many of the desirable features of a freely functioning price system as possible."

This is right in line with Mr. Williams' comments above.

C.E.D. in its suggested solutions urged the adoption of a specific target date—perhaps five years—during which to bring production of now-surplus crops into balance with demand.

Mr. Williams' point is that demand could and should be created through the well-established forces of advertising and modern marketing methods.



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300 ATTEND CALIFORNIA CONFERENCE

Three hundred persons attended the Fourth Annual California Fertilizer Conference on the campus of the University of California at Riverside under the sponsorship of the soil improvement committee, California Fertilizer Association. Dr. Alfred M. Boyce, director of the Citrus Experiment Station, Riverside, welcomed the Conference and its delegates to the campus.

The banquet speaker was Dr. G. B. Wood, head, department of agricultural economics, Oregon State College, Corvallis, Oregon. He outlined current economic conditions in a most interesting and entertaining manner.

Dr. Oscar E. Lorenz, professor of vegetable crops, University of California, Riverside, reported new information on phosphate response in vegetable species trials in Imperial Valley.

Dr. Emil Truog, emeritus professor of soils, University of Wisconsin, spoke on soil as a medium for plant growth. He outlined methods being employed in dealing with acid soil conditions which prevail in Wisconsin.

Dr. Logan Carter, head, department of soils, California State Polytechnic College, San Luis Obispo, outlined in detail the economic value of proper fertilizer use in dry range production of beef cattle.

Dr. Roy Branson, assistant chemist, department of soils and plant nutrition, University of California, Riverside, reviewed the lysimeter program at Riverside during the past twenty years, and reported that the University will install 24 additional lysimeter tanks for new twenty year studies on major and minor plant nutrients under completely controlled conditions.

Allen B. Lemmon, chief, California bureau of chemistry, Sacramento, presented an outline of the desirability and the problems involved in changing the guarantees which the fertilizer industry has been using for many years. Involved will be a change from phosphorus pentoxide (P_2O5) to elemental phosphorus (P); and potassium oxide (K_2O) to elemental potassium (K). The American Association of Fertilizer Control Officials has been surveying the subject to determine the amount of support which the industry and the general public would likely give to such a change, and has found evidence of considerable support for the change. A transition period of perhaps five years will be required during which an educational campaign will be conducted to familiarize all concerned with the changes in formula designations which will be brought about.

Dr. Tom W. Embleton, assistant horticulturist, University of California, Riverside, described the fertilizer test plots to be seen on the following day during the tour at Agua Tibia Ranch in northern San Diego County. He said that orange

1. Panel on Phosphate Fertilization: Dr. Emil Truog, Dr. A. O. Lorenz, Howard H. Hawkins, Moderator, Dr. Tom W. Embleton, Dr. Frank T. Bingham.
2. Panel on Salinity Problems: Dr. Milton Fireman, Dr. Robert Harding, Dr. D. G. Aldrich, Jr., Moderator, Dr. O .R. Lunt, Warren R. Schoonover, Dr. Leon Bernstein.
3. Luncheon, students cafeteria.
4. Dr. Logan Carter, Head, Dept. of Soils, California State Polytechnic College, San Luis, Obispo, speaking on "More Grass, More Beef, More Profit."
5. Dr. Roy L. Branson, Asst. Chemist, Dept. of Soils & Plant Nutrition, University of California, Riverside, speaking on the Lysimeter as a fertilizer research tool.
6. J. H. Nelson, Nelson Laboratories, Stockton, Conference Chairman.
7. Allen B. Lemmon, Chief, California Bureau of Chemistry, Sacramento, speaking on "Guarantees in Terms of Elements."
8. Meeting of Committee on Bankers Information: B. H. Jones, President, Sunland Industries, Inc., Fresno, Dr. D. G. Aldrich, Jr., Chairman, Dept. of Soils and Plant Nutrition, University of California, Davis & Berkeley, Sidney H. Bierly, Manager, CFA, San Marino, James M. Quinn, Owner, California Sun Fertilizer Co., & Committee Chairman, Los Angeles, George R. Monkhouse, Vice President, Shell Chemical Corp., San Francisco, Wilson Meyer, President, Wilson & Geo. Meyer Co., San Francisco, Arthur W. Mohr, President, California Spray Chemical Corp., Richmond.

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and avocado plots had been laid out in this area of known deficiencies in phosphate, manganese and zinc. Different fertilizer treatments show up distinctly in the trees and fruit, he said.

One of the most interesting features of the Conference was informal discussion with two panels, one on salinity problems and the other on phosphate. The Conference was split into two groups, and the panels rotated between these groups. The salinity panel was moderated by Dr. D. G. Aldrich, Jr., chairman, department of soils and plant nutrition, University of California, Davis and Berkeley. Those on the panel were Dr. Milton Fireman, agricultural extension service, Riverside; Dr. Robert B. Harding, department of soils and plant nutrition, University of California, Riverside; Dr. O. Raynal Lunt, assistant soil scientist, University of California, Los Angeles; Warren R. Schoonover, agriculturist, agricultural extension service, University of California, Berkeley; and Dr. Leon Bernstein, U.S.D.A. salinity laboratory, Riverside.

The phosphate panel, moderated by Howard H. Hawkins, Golden State Plant Food Company, Glendora, consisted of Dr. Frank T. Bingham, department of soils and plant nutrition, University of California, Riverside; Dr. Embleton; Dr. Lorenz; and Dr. Truog.

The University of California fertilizer committee and the soil improvement committee of the California Fertilizer Association met at dinner under the joint chairmanship of Dr. E. Louis Proebsting, pomologist, University of California, Davis, chairman of the university committee; and Millard E. McCollam, Western manager, American Potash Institute, Inc., San Jose, chairman of the soil improvement committee.

The final day was devoted to a conducted tour of fertilizer test plots at the citrus experiment station, Riverside, including the lysimeter area; and at the citrus and avocado groves on Agua Tibia Ranch, Pala, San Diego County. A tour was also made of the facilities and test plots at the USDA salinity laboratory, Riverside.

CFA president, William E. Snyder, who had opened the Conference, closed it following the banquet speaker, with an expression of thanks to the personnel of the University of California for their splendid cooperation and participation.

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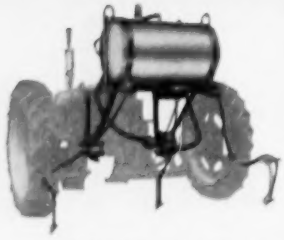

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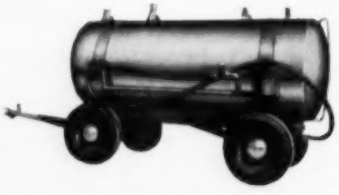

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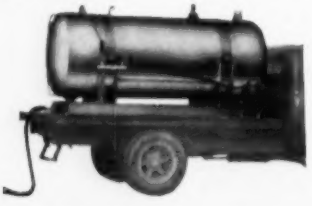
THE FAMOUS "SPEEDY-SPREAD"—A COMPLETE TRAILER-MOUNTED FIELD APPLICATOR

Includes: 2-wheel trailer, aluminum tank with No. Car.-approved measuring gauge for custom operators, 21-ft. boom with complete set of nozzles, P. T. O. pump, sub-surface attachments, all fittings, valves, and other components. (Also custom-built to your specifications.)



COMPLETE TRUCK-MOUNTED NURSE TANKS

Includes: 1,000-gal. aluminum tank with saddles, air compressor, hoses, gauges, all fittings, valves, and other components.

"COMPLETE" means that ONE ORDER can completely equip you for using nitrogen solutions. CALL, WRITE, OR WIRE Today for Full Information.

GENERAL METALS, INC.
858 Goldsboro St. Greensboro, N. C. Phone 4-5451

Institute Offers TV Soil-Sample Movie

A 13-minute version of "The Big Test," a film story of how to take a soil sample properly, now is ready for distribution to television stations by the National Plant Food Institute.

The film focuses attention on the importance of soil testing in a good farm management program. Entertainingly and dramatically told, the story unfolds the experiences of a farmer and his step-by-step soil testing procedures.

Television versions of feature length films and other Institute films produced especially for television are widely used throughout the United States.

New Bemis Reinforced End Multiwall Bag

A new sewn multiwall paper shipping sack featuring reinforced end construction has been announced by Bemis Bro. Bag Company. The reinforcement consists of strips of kraft paper between plies at the bag's top and bottom, giving the effect of an extra ply at

the points where most sewn multiwall bag breakage occurs.

The new bags, called "Strengthend" by the company, have been undergoing extensive test shipments for several months. Highly satisfactory performance is reported.

Aylward Aqua Ammonia Use Portable Converter

A new portable ammonia converter was put into operation in April to serve the first four aqua ammonia stations of the Aylward Fertilizer Company in Illinois. The converter was designed and manufactured by the J. C. Carlile Corporation, Denver, Colo. This Carlile converter maintains the high conversion and cooling efficiencies as well as the simplicity of larger stationary units, without sacrifice for portability. Quick connections provided for the four operating circuits permit hooking up the converter in about ten minutes at each aqua ammonia station. In addition to speed, ease of operation and ready access to all operating parts are important features of the design.

The converter is mounted on a short lowboy trailer and is capable of speeds up to 45 MPH, depending on road conditions, between stations Converter arrival at a station is timed to coincide with that of a railroad car of anhydrous ammonia. Conversion is done directly from the car and no provision is made for anhydrous ammonia storage. High capacity of the unit permits conversion of a tank car of ammonia in four to seven hours.

The Aylward Fertilizer Company, of Sullivan and El Paso, Ill., has eliminated the cost of transporting the water content of aqua ammonia over long distances, or the alternate expense of stationary converters at each of the ammonia stations.

Aylward, a pioneer in the liquid fertilizer industry, is the first in the Midwest to utilize the portable converter. Previous to the purchase of this Carlile unit, the economics involved were thoroughly studied by Aylward officials and the Carlile Corporation, together with a major ammonia producer. Four central Illinois stations of those projected are now in service. When all four are in operation, a complete circuit by the converter will cover approximately 300 miles of highway travel.

Further information on the portable converter can be obtained from J. C. Carlile Corporation, 425 Cooper Bldg., Denver 2, Colo.

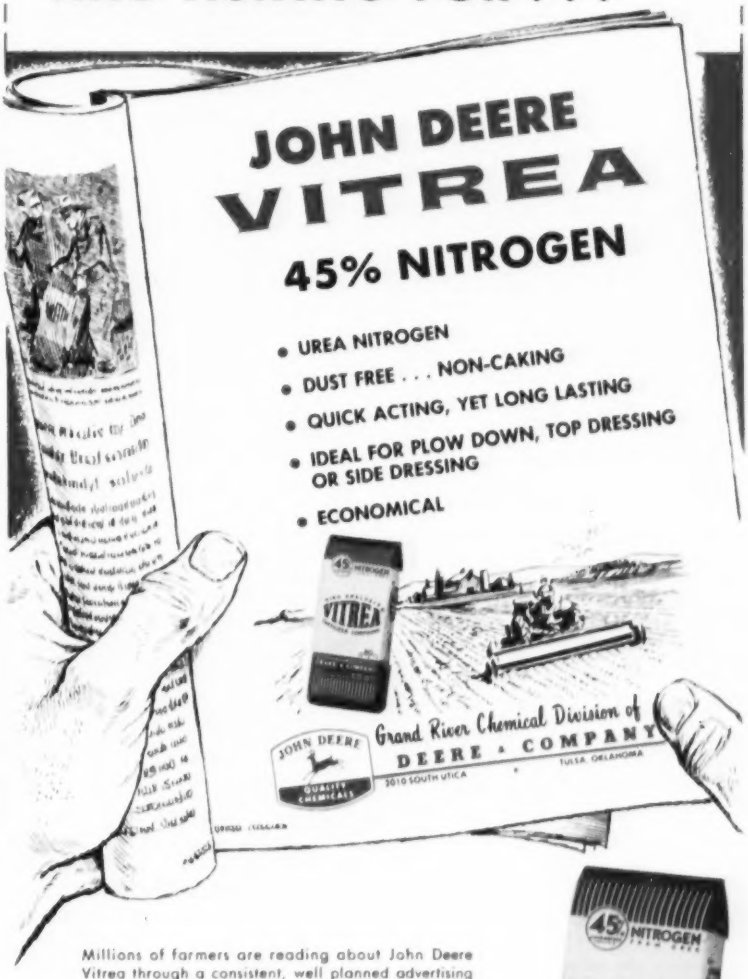
FARMERS EVERYWHERE

ARE READING ABOUT AND ASKING FOR . . .

JOHN DEERE VITREA

45% NITROGEN

- UREA NITROGEN
- DUST FREE . . . NON-CAKING
- QUICK ACTING, YET LONG LASTING
- IDEAL FOR PLOW DOWN, TOP DRESSING OR SIDE DRESSING
- ECONOMICAL



Millions of farmers are reading about John Deere Vitrea through a consistent, well planned advertising program . . . designed to help you make more sales . . . to help farmers make more profit.

- **Ideal for direct application . . . liquid or dry mixing**
- **In 80 pound bags or in bulk, coated or uncoated**
- **Fast dependable service**

AVOID THE RUSH . . .
ORDER VITREA OR ANHYDROUS AMMONIA NOW!

JOHN DEERE QUALITY CHEMICALS

Grand River Chemical Division of
DEERE & COMPANY
2010 SOUTH UTICA • TULSA, OKLAHOMA

CF Staff-Compiled TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by COMMERCIAL FERTILIZER Staff

State	April		March		Feb.	Jan.-Feb.-Mar. Quar.		July thru Dec.		Year (July-June)	
	1956	1955	1956	1955	1956	1956	1955	1955	1954	1954-55	1953-54
Alabama	.....	244,382[1]	246,239	315,818	78,927	347,660	433,390	167,372	272,068	1,114,238	1,074,892
Arkansas	.....	72,578[1]	92,766	81,579	33,986	141,981	134,588	60,294	59,887	330,776	366,225
Georgia	343,425	377,103	133,176	181,966	47,499	221,862	328,956	250,968	225,083	1,273,445	1,361,254
Kentucky	.....	.....	.....	.....	35,730	.....	.....	88,119	91,386	524,488	577,929
Louisiana	67,269	55,314	57,828	85,771	22,925	93,469	123,971	59,345	78,067	310,848	325,218
Missouri	.....	102,326[1]	.....	120,206[1]	55,853	.....	189,351[1]	360,211	268,257	682,690	756,457
N. Carolina	.....	451,785[1]	417,258	514,314	178,085	681,897	825,492	225,182	264,475	1,830,633	1,815,572
Oklahoma	13,969	13,913	18,749	17,212	11,191	31,884	35,770	69,542	58,406	122,305	144,367
S. Carolina	169,465	156,388	286,994	327,687	123,996	452,619	521,836	119,947	132,604	928,715	936,558
Tennessee	97,059	88,416	33,783	47,929	13,554	50,736	63,463	136,925	167,383	523,349	523,303
Texas	77,188	63,947	101,164	120,936	52,179	180,802	214,792	193,704	212,885	584,269	560,381
California (reports submitted quarterly)						280,853	283,155	351,615	318,270	922,127	830,327
Virginia (reports submitted quarterly)						.....	287,367[1]	.....	159,185[1]	795,770	780,931
Indiana (reports submitted semi-annually)								242,530	284,994	1,158,960	1,180,091
New Jersey (reports submitted semi-annually)								.....	53,830[1]	.....	289,614[1]
Washington (reports submitted semi-annually)								48,749	58,162	182,348[1]	*
TOTAL	768,375	1,626,152	1,387,960	1,693,212	653,925	2,483,763	3,442,131	2,384,503	2,486,900	11,102,613	11,233,505

..... (not yet reported) * Not compiled [1] Omitted from column total to allow comparison with some period of current year.

MARKETS

ORGANICS: Producers of Nitrogenous Tankage have been selling good quantities for current and fall use. One major producer is sold out through August and heavily sold also for later months. Prices now range for September forward shipment from $3.00 to $3.50 per unit of Ammonia, bulk, f.o.b. Midwestern production points and $3.25 to $3.75 for January forward shipment.

Sewage Sludge continues in well sold position at current prices of $2.95 per unit of Ammonia and 50c per unit of APA, bulk, to $3.00 per unit of Nitrogen and 50c per unit of APA, f.o.b. shipping point, depending on the location of production.

CASTOR POMACE: Supplies continue at low levels and prices are currently $40.00 per ton, bagged, f.o.b. Northeastern points of production, although a limited tonnage was reported sold off at $35.00 but it is no longer available at that price.

DRIED BLOOD: Unground Blood in bags in the Chicago area is indicated at $5.25 per unit of Ammonia and New York area $4.50 to $5.00.

POTASH: Producers were counting on May sales to offset much of the slow movement earlier in season, however, sales continued poor but prices remain steady.

GROUND COTTON BUR ASH: Demand continues excellent for this source of Potash which is primarily in the form of Carbonate of Potash. Supplies are available for shipment prompt through June. Current analyses vary from 38% to 42% K_2O which makes for a delivered cost approximately that of Domestic Sulphate of Potash.

SUPERPHOSPHATE: No unusual activity is noted in this market and prices remain steady.

PHOSPHATE ROCK: Defluorinated Phosphate advanced in price $2.00 per ton effective May 15th on 14½ and 17% grades and expected June 1st the 18% will increase also. Phosphate Rock for acidulating purposes continues in ample supply and price steady.

NITRATE OF SODA: Stocks remain adequate and seasonal demand is currently strong in the Southeast. Prices remain unchanged in spite of the reduced price of Sulphate of Ammonia.

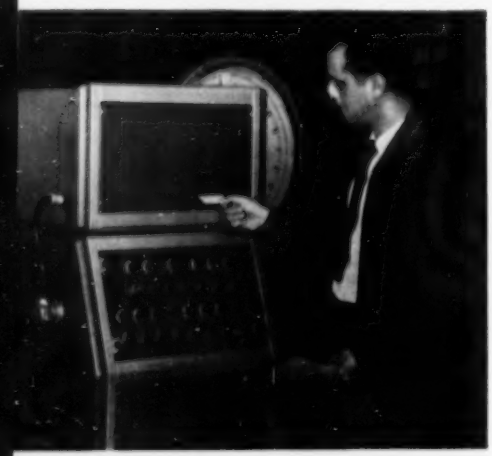
SULPHATE OF AMMONIA: Coke-Oven Sulphate of Ammonia producers reduced price at the mills by $10.00 per ton beginning May 7th and most producers of synthetic grade have adjusted their prices in line. The mill price is now $32.00 per ton, bulk, in the Southeast.

GENERAL: Because of poor weather conditions, replanting of crops such as corn and cotton in the Southeast has been necessary, sometimes as many as three times, resulting in a quite delayed movement of fertilizers, particularly top dressing and side dressing materials. Most fertilizer manufacturers however have completed greater part of their shipments of mixed goods.

An electronic weigh batching system that will work in conjunction with IBM's punch card system has been perfected by The Heltzel Steel Form and Iron Co., Warren, Ohio, after some 30 months of development and testing.

Called the Helco-matic Batchmaster, it unites for the first time the speed and accuracy of electronics with commercially acceptable weighing units.

Typical applications include chemical batching, fertilizers. Further details can be had by writing direct to The Heltzel Steel Form And Iron Co., Warren, Ohio.

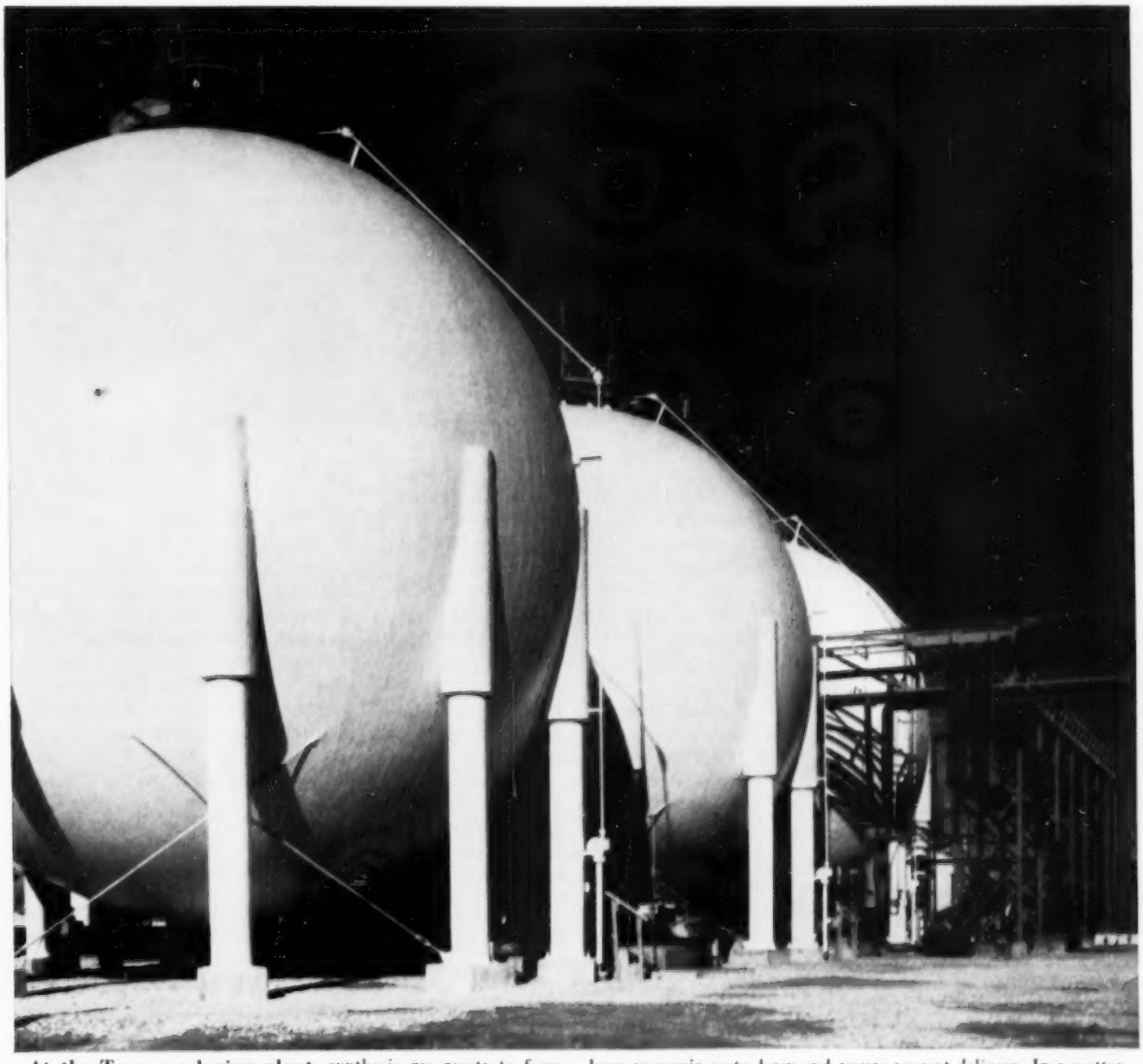


A&S Bags Feature New "Tilted" Valve

Arkell & Smiths, multiwall bag manufacturers with plants at Canajoharie, N. Y., Mobile, Ala., and Wellsburg, W. Va., recently announced the development of a "Tilted valve" multiwall bag.

The principle of the tilted valve is that the flow of material during filling forces the valve upward and closed, reducing sifting both during and after filling. This new valve also facilitates fitting the bags on filling spouts.

The tilted valve bag is now in production and is offered to the trade without upcharge.



At the Texas producing plant, synthesis gas reacts to form ammonia. This plant operates efficiently and continuously to keep ammonia costs down and assure prompt delivery. In a matter of hours, several days' production can be loaded for shipment.

strategically located plants speed the delivery of

DOW AMMONIA

Your guide to DOW, the reliable source, with three plants to serve anhydrous or aqua ammonia needs promptly.

In ordering ammonia today, tomorrow or next year—you can always count on speedy delivery from DOW, one of the oldest producers in the country.

Three ammonia-producing plants make the difference, are strategically located to assure a ready supply . . . any time . . . anywhere. Can we serve you now? THE DOW CHEMICAL COMPANY, Midland, Michigan.

you can depend on DOW CHEMICALS

DOW

Random NOTES & QUOTES

Only 7% of the US total labor force, instead of the 15% now so employed, will be needed to work farms by 1970, according to a report from the Senate Committee on Labor and Public Welfare. Crop chemicals, which have increased 10-fold since 1933; chemically coated seeds —and mechanization of many kinds —is the answer, of course.

We do not know if the Senate Committee staff took into consideration the "5th Plate" demand for food which is expected by that same date . . . and about which, by the way, we have heard very little lately.

* * *

Corroded TV aerials are the latest complaint we have read about from the neighbors of a fertilizer plant. This is really bringing it up-to-date!

* * *

Freight savings can well result for many fertilizer manufacturers as the result of a decision by the Supreme Court in the case of some sulphur shipments from Galveston. The decision requires rates based on the economy of water carriers, when such enter into the route in competition or collaboration with rail carriers.

* * *

Floyd scholarships will benefit botany and allied field students because the $200,000 estate of the late Col. Bayard F. Floyd, who was vice-president of Wilson-Toomer Fertilizer from 1921 until his death in 1945, has been willed to Indiana University by his widow.

* * *

Atoms for Peace is the title of a colorful folder issued by Phillips Petroleum to explain what they are doing for the Atomic Energy Commission.

* * *

Trees vs grass: At the recent Chemurgic Conference in Chicago one of the committees—that on land use—came up with a thought that may well be startling to many in our industry: "Much land retired from crops has gone into grass when it might more wisely have been planted to pine and other forests."

* * *

Packer's viewpoint: John Holmes, president of Swift & Co., on the other hand, was eloquent on the need for more grassland so we can grow more meat—when he spoke in Atlanta, Georgia recently to the C of C dinner for the American Meat Institute directors. "Too much emphasis on cultivated crops . . . have upset our farm economy by piling surplus crops into government storage."

It is a fact—you never hear the cattle raisers screaming for parity!

* * *

Airport offices are something new. Frontier Chemical in Kansas found most of its visitors came by air, and spent more time getting to and from the port than they did in conferences. So they rented space in the new Wichita airport building, and moved their headquarters offices out there.

* * *

Float whistle: A horn than can be heard more than a thousand feet away from the tank being filled gives warning when chemical storage tanks are approaching the danger point. A float operates the unit, which is energized by nitrogen, com pressed air, carbon dioxide etc.

* * *

Termite moan: The editor of Shell Chemical Agricultural News, a sprightly sheet, got thinking about termites, and turned out this "pome:"

Your home, you think, is safe and sound
From mortgages and fire.
But don't forget that underground
Some deadly plots transpire!
Within the soil the termites live,
Just waiting for a meal.
They'll make your home look like a sieve,
And you'll feel like a heel.
A dose of dieldrin in the soil
Protects your house for years.
Attacks of termites you will foil,
And cut short their careers.

* * *

There are more than 2¼ billion beneficial bacteria in every thimble full of fertile top-soil, the Fourth Annual California Fertilizer Conference was told at Riverside by Dr. Emil Truog, Emeritus Professor of Soils, University of Wisconsin.

"When soils are in proper condition for crop production," he said, "they often contain five tons or more per acre to plow depth of living matter in the form of bacteria, fungi, actinomyces, protozoa, algae, earthworms, etc. This live matter is of great importance in soils. Without it, plant residues would not decompose and crop production in the usual manner would soon be impossible."

Truog pointed out that organic matter in the soil is the food that nourishes these billions of microorganisms. It not only promotes favorable biological conditions, but it also improves the physical condition of the soil, said Dr. Truog, increasing the infiltration rate of water into the soil, and decreasing runoff and erosion. In addition, he said, organic matter promotes the availability of plant food elements for crops.

The possibility of adding more and more organic matter to the soil in the form of animal and green manure is greatly aided by applying commercial fertilizer whenever needed, he said. This promotes high crop yield, he concluded.

Dunton To Headline Delmarva June Meeting

Dr. H. L. Dunton, head of Agronomy Department, Virginia AES at Blacksburg, Virginia, will be principal speaker at the 35th annual convention of Delmarva Peninsula Fertilizer Association, Ocean City, Maryland, Saturday, June 30, at 10:30 in the George Washington Hotel.

This convention, open to all farmers and wives, will also feature representatives from the National Plant Food Institute, who will discuss new developments and trends in fertilizer application and use.

Dr. Dunton, a native of Exmore, Virginia, has served as a county agent, Extension agronomist, Soil Conservation technician, State Certified Seed advisor, and has served on the Virginia Fertilizer Advisory Committee. He also is listed in "Who's Who in America." He will speak on the subject "What Every Fertilizer Salesman Should Know."

The Delmarva Association, comprised of Delmarva fertilizer manufacturers, meets periodically to discuss means of helping the local farmers to earn more profit per acre. Salesman and fertilizer agents, are expected to attend the conven-

tion; also, agronomists, soil technicians, county agents, and fertilizer inspection control officials.

Of special interest this year will be presentation of an award to the person contributing most to development of agriculture on the Delmarva Peninsula.

AP&C Opens DC Office

American Potash & Chemical Corporation has announced the establishment of offices at Washington, D. C., for the purpose of improved liaison between governmental agencies and the company's department of defense programs, according to an announcement by George S. Wheaton, company defense programs vice-president.

Herbert W. Yeagley has joined them to head the Washington office, reporting to Mr. Wheaton at the company's Los Angeles headquarters. The Washington office will be located in the Investment Building at 15th and K Streets.

Mr. Yeagley, who was educated at Alabama Polytechnic Institute (Auburn), came to American Potash & Chemical from Monsanto Chemical's inorganic chemicals division at the St. Louis plant where he was manager of the sales-production liaison department. Mr. Yeagley had been with Monsanto since 1942, being assigned to their Washington office from 1946 to 1951.

Alcoa Head, Moves Into Florida Chemical Industry

Arthur Vining Davis, multi-millionaire chairman of the Aluminum Company of America, has become active in Florida's expanding chemical industry with an initial purchase of 25,000 shares of preferred stock of Re-Mark Chemical Company, a fast-growing agricultural chemical firm located in Miami. The purchase marks Davis' entrance into Florida chemical industry activity. The aluminum tycoon whose fortune has been estimated to be as high as 350 million dollars, has been investing in Dade County (the Greater Miami area) real estate to the tune of about $250,000.00 a day since the beginning of 1956 which, together with previous land investment, has given Davis control of ⅛ of the land area of Dade County.

Ninol Moves Offices

Ninol Laboratories are in their new offices, Prudential Plaza, Chicago 1, Ill. Phone WHitehall 4-6323.

INDUSTRY CALENDAR

Date	Organization	Place	City
June 10-13	Nat'l. Plant Food Inst.	Greenbrier	White Sulphur
June 20-22	NE-ASA	U. of Md.	College Park, Md.
June 28-30	Sou. Control Officials	Roanoke	Roanoke, Va.
June 28-30	Pacific N.W. Plant Food	Chinook	Yakima, Wash.
June 30	Del-Mar-Va Peninsula	Geo. Washington	Ocean City, Md.
July 4-8	E. Canada Plant Food Prod.	Mt. Tremblant Lodge	Mt. Tremblant, Q.
July 12	S. C. Fertilizer	Edisto Sta.	Blackville, S. C.
July 18-20	S.W. Grade Hearings	Bucaneer	Galveston, Tex.
July 26-27	Illinois Fertilizer	U. of Ill.	Urbana, Ill.
Aug. 1	Ky. Fert. Conf.	Guignol Theatre	Lexington, Ky.
Aug. 30	S. C. P. F. E. S.	Clemson House	Clemson, S. C.
Oct. 19	Control Officials Assn.	Shoreham	Washington, D. C.
Nov. 2	Sou. Soil Conf.	Atlanta Biltmore	Atlanta, Ga.
Nov. 11-13	Calif. Fert. Assn.	Coronado	Coronado, Cal.

Basic Cluster Hopper to which the various top and bottom arrangements shown at right may be adapted. This Cluster Hopper has proved highly satisfactory for extreme low headroom and ease in operation with minimum maintenance.

Complete Stock Mills or Hopper Systems to supplement your existing equipment are designed in either stock sizes or in any desirable shape, size or capacity to suit your individual needs. SAVAGE Hopper Systems are ideal for batching materials for granulating operations now in existence or anticipated for the future. SAVAGE conveyors, elevators, feeders and bins also are available in any required length, capacity or shape.
When planning for additions or alterations, contact us for a descriptive bulletin covering our services and equipment.

K. E. Savage COMPANY

823 West 21st St. NORFOLK 10, VIRGINIA

★

A simple and trouble-free method of feeding the compartments of the Hopper System by utilizing a direct spout from the elevator and a swivel spout mounted at the center of the top of the Hopper System.

★

Low head-room method of feeding the Hopper System, using a belt conveyor, shaker screen and swivel spout. The tailings are spouted to a tailings mill and then back into the elevator.

★

A very fine top arrangement of the Hopper System, using a spout direct from the elevator to the top of the shaker screen.

★

Arrangement of base of Hopper System utilizing 1, 1½ or 2 ton mixer, which can be used in place of surge hopper and belt conveyor.

Convention

SOUTHERN FEED and FERTILIZER CONTROL OFFICIALS

HOTEL ROANOKE, ROANOKE, VIRGINIA—JUNE 28-30

Thursday Morning, June 28, 1956
8:00 Registration
9:30 Invocation
Welcome—Charles W. Wampler, President, Virginia State Board of Agriculture.
Roll Call
Report of Secretary-Treasurer
Announcements and appointments of Committees
10:00 "Southern Standards"—President's Address by M. P. Etheredge, Dean and State Chemist, Mississippi State College, State College.
10:30 Address—W. E. Glennon, President, American Feed Manufacturers Association, Chicago, Illinois.
11:00 Address—Russell Coleman, Executive Vice-President, Research and Education, National Plant Food Council, Washington, D. C.
11:30 "The Legal Framework for Regulatory Control"—John D. Conner, Attorney, Sellers & Conner, Washington, D. C.
12:00 Noon Recess

Afternoon
1:30 "New Developments and Research in the Sugar Industry Related to Animal Feeds"—L. G. Joyner, Director of Research, Godchaux Sugars, Inc., Reserve, Louisiana.
2:00 "The Atomic Approach to Nutrition Problems"—Homer Patrick, Program Director, Agricultural Research Program (U.T.-A.E.C.), Oak Ridge, Tennessee.
2:30 Report of the Committee on Feed Standards.

Night
6:00 Social Hour
7:00 Banquet—Speaker, Parke C. Brinkley, Commissioner of Agriculture, Richmond, Virginia.

Friday Morning, June 29, 1956
9:00 "The Control Official and His Services to Agriculture"—L. B. Dietrick, Dean of Agriculture, Virginia Polytechnic Institute, Blacksburg.
9:30 "How Can Industry Cooperate With Control Officials and Agricultural Workers"—L. Y. Ballentine, Commissioner of Agriculture, Raleigh, North Carolina.
10:00 "Factors Affecting Efficient Fertilization"—H. L. Dunton, Head, Agronomy Department, Virginia Polytechnic Institute, Blacksburg.
10:30 Recess
10:45 "How the Field Supervisor Can Be of Assistance to the Inspectors"—E. H. Isbell, Supervisor, Field Inspection, Department of Agriculture, Richmond, Virginia.
11:15 Panel Discussion of topics and questions submitted—J. F. Fudge, L. C. Jacobs, Bruce Cloaninger, C. E. Floyd, S. F. Thornton and V. Sauchelli.
12:00 Noon Recess

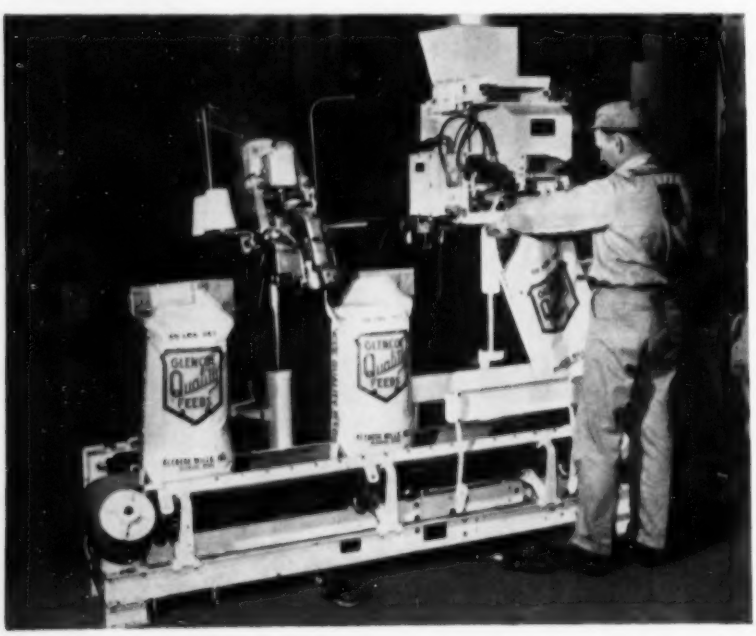
Afternoon
1:30 Tour of Lindsey-Robinson Mill
3:30 "Recent Developments in Nematocides"—M. A. Manzelli, Research Department, Virginia-Carolina Chemical Co., Inc., Richmond, Virginia.
4:00 Round Table Discussion on Pesticides.

Night
7:30 Executive Committee Meeting

Saturday Morning, June 30, 1956
9:00 Report of Committees
Business Session
10:00 Adjourn

The Bemis "Packer-Ette," a new automatic bag packer designed to bring speed and accuracy to medium sized packing operations, has been introduced by Bemis Bro. Bag Company's Packaging Service. It fills the gap between the slow, cumberome equipment frequently found in small bag packing operations, and the expensive equipment necessary to larger operations.

Bag capacities of the "Packer-Ette" range from 25-lb. to 150-lb. sizes, giving the machine extreme versatility. It is highly accurate.



Safety Contest Ends This Month

The Fertilizer Section of the National Safety Council has been conducting a safety contest, with $500 in prizes, which began April 1 and ends June 30. Any employee in the fertilizer industry is eligible to enter, and no entry blank is needed.

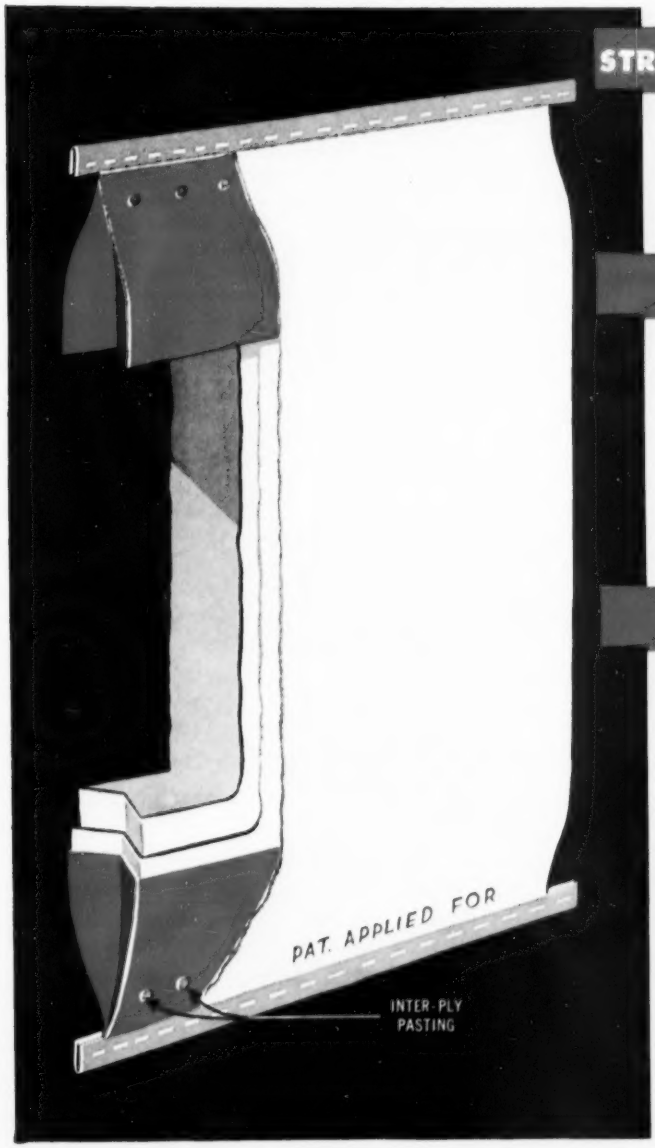
Simply take a picture of any new device, improved equipment, tested operation or other better way of doing a job which has improved safety in your plant. Write a short statement telling about the original unsafe situation, what was done to correct it, and what were the results.

Send this to J. C. Kato, Fertilizer Section, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

That's all . . . and it may win you one of the top prizes.

New *Strength-end* * Bemis Multiwalls

the shipping sack with BALANCED STRENGTH



STRONGER AT THE RIGHT PLACES

New Bemis Strength-End Multiwalls, strengthened top and bottom where most sewn bag breakage is experienced, will cut packing troubles and costs for you.

TWO WAYS TO SAVE

You'll save money one of these two ways with Bemis Strength-End Multiwalls: You may switch from a more expensive type of shipping container. Or, if you are already using multiwalls, you might use bags with fewer plies, because of the greater end strength, where it is needed. Bemis Strength-End Multiwalls may, at lower cost, do your job as well or better.

SUCCESSFULLY TESTED

Bemis Strength-End Multiwalls have been successfully tested in all sections of the country and under all climatic conditions. They have proved themselves for packing cement, fertilizer, chemicals, flour, salt.

Here's how it's reinforced

The reinforcement in Bemis Strength-End Multiwalls is a strip of sturdy kraft, several inches wide, running horizontally around the bag at the ends . . . anchored to the other walls so it works in conjunction with them . . . and adding greatly to the strength both at the sewing line and at the gusset corners. It's just plain, common-sense, balanced strength construction.

*TRADE-MARK

Get the complete story about Bemis Strength-End Multiwalls from your Bemis Man.

Bemis BEMIS BRO BAG CO.

General Offices—St. Louis 2, Mo.
Sales Offices in Principal Cities

U. S. Department of Commerce Report

PHOSPHORUS and PHOSPHORIC ACID

It looks as though elemental phosphorus capacity in the United States will top out around 383,000 annual tons by July of next year, while by the same time capacity for phosphoric acid will reach well over 2,000,000 annual tons. And more than half of this is consumed in the fertilizer industry. In fact, our share of acid is up to 52% now, as compared with 50% in 1954.... and our share is of the greatly expanded capacity.

All this comes out of the report published by the US Dept. of Commerce recently released.

We are in second place as consumers of phosphorus itself, and we are in that place largely because of the production of concentrated superphosphate, calcium metaphosphate and other phosphatic materials by TVA. The domestic production has shown a steady rise since 1951, and during the period since hardly any has been imported. The report notes that the largest receipts in the 5 year period occurred in 1955 when 130 tons were imported! During the last quarter of last year our output was running at 96% of capacity, an annual rate of 306,000 tons.

Acid production is well distributed throughout the farming areas. Plants in operation—19 in number—are located as follows: Alabama, 1; California, 3; Illinois, 2; Indiana, 1; Kansas, 1; Massachusetts, 1; Michigan, 1; New Jersey, 3; New York, 1; Ohio, 1; Pennsylvania, 1; South Carolina, 1; Tennessee, 2. Plus a Texas unit expected to be completed this year.

This report is based on data compiled in connection with a special survey conducted by the Chemical and Rubber Division. Data from other sources are also included to supplement the survey.

Prepared by C. KENNETH HORNER

Phosphorus

Capacity

Annual capacity for the production of elemental phosphorus was reported at 320,000 short tons as of January 1, 1955. This level is nearly double that in existence on January 1, 1951, and exceeds by 45,000 tons the expansion goal set by the Office of Defense Mobilization for completion in 1955. Additional expansions completed during 1955, plus those currently under construction or authorized, will bring total capacity to 383,000 tons by July 1, 1957.

The expansion in phosphorus capacity since 1950 has been accomplished by the construction of 4 new plants, plus additions or improvements of installations then in existence. One establishment in New Jersey was shut down in 1954. There are currently 8 companies with a total of 12 plants producing phosphorus. The plants are located in the following States: Alabama, 1; Florida, 3; Idaho, 2; Montana, 1; New York, 1; South Carolina, 1; and Tennessee, 3.

Production

Production of phosphorus has shown a constant increase since 1951, in approximate proportion to the expansion in capacity. The most rapid growth, as indicated in table I, occurred between 1952 and 1954. The 1955 production, which was compiled from producers' estimates made in October, appears to have been underestimated by approximately 5,000 tons, according to preliminary Bureau of the Census figures. During the last quarter of 1955, output was running at the annual rate of 306,000 tons or 96 percent of capacity.

Imports

Imports of elemental phosphorus have been negligible in recent years. The largest receipts in the last 5 years occurred in 1955 when approximately 130 tons, mostly from Canada, were imported.

Use Distribution

The distribution of phosphorus by the principal ultimate end uses are shown in table I for 1950 and 1954-55. The data for 1954-55 were compiled from the reports of producers in a recent survey conducted by the Chemical and Rubber Division and represent the producers' own consumption plus sales. For comparative purposes, previously unpublished data for 1950 compiled by the then Chemical Division of the National Production Authority are also given.

The largest use for phosphorus by far, primarily in the form of the various sodium phosphates, is in soaps, synthetic detergents, and sanitizers. This category accounted for 37 percent of the total distribution in 1950, 45 percent in 1954, and 44 percent in 1955. The survey did not request a separation of use among the above three types of cleaners. However, the marked increase since 1950 in consumption

Table I.—Elemental Phosphorus—Capacity, Production and Distribution by Use, 1950, 1954, and 1955

(Short tons P)

	1950	1954	1955
Capacity, January 1	[1]161,300	([2])	320,000
Production[3]	153,550	268,709	[4]287,308
Distribution, total	153,550	262,500	280,622
Soaps, detergents and sanitizers	57,050	118,103	123,315
Fertilizers	24,050	45,512	44,150
Foods and beverages	18,600	17,011	20,842
Animal feed supplements	9,350	15,649	16,963
Water conditioning	9,300	11,373	11,732
Metal cleaning, coatings and other surface protection	4,400	7,745	11,791
Petroleum production and refining, including additives	5,500	5,285	7,013
Pharmaceuticals and drugs, including dentifrices	5,800	5,047	5,226
Plastics and plasticizers	4,400	3,680	4,145
Matches and fire retardants	950	1,460	1,436
Miscellaneous, including dealers	14,150	23,968	25,643
Exports, including phosphorus content of derivatives	([5])	7,667	8,366

[1]Capacity as of January 1, 1951. [2]Not available. [3]Production according to the Bureau of the Census was 147,698 tons in 1951; 158,324 tons in 1952 and 212,957 tons in 1953. [4]Compiled from producers' estimates as of October 1955. [5]Quantities of phosphorus and derivatives exported in 1950 were not specified.

Source: Based on a special survey conducted by the Chemical and Rubber Division, BDSA.

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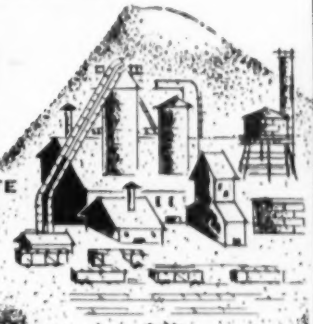

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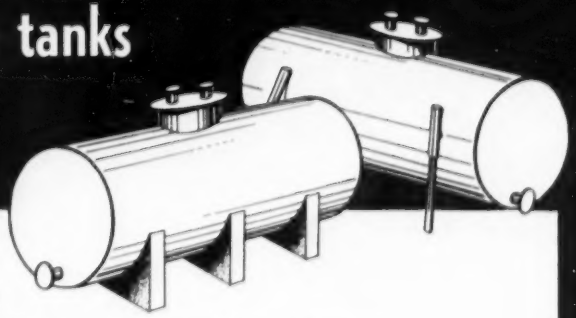

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Table II.—Phosphoric Acid—Capacity, Production, and Distribution by Use, 1954 and 1955
(Short tons P_2O_5)

	Acid from phosphorus		Wet-process acid		Total acid from both processes	
	1954	1955	1954	1955	1954	1955
Capacity, January 1	(1)	771,524	(1)	993,210	(1)	1,764,734
Production	530,883	568,106	649,965	780,721	1,180,848	1,348,827
Distribution, total	519,540	556,303	649,965	770,223	1,169,076	1,326,526
Fertilizers	76,382	67,587	512,547	621,530	588,929	689,117
Soaps, detergents and sanitizers					347,252	364,502
Animal feed supplements					52,735	67,751
Foods and beverages					38,898	48,150
Water conditioning					33,996	31,831
Metal cleaning, coatings, and other surface protection	(2)	(2)	(2)	(2)	19,926	29,940
Pharmaceuticals and drugs, including dentifrices					11,184	11,701
Petroleum production and refining, including additives					10,239	12,803
Miscellaneous, including dealers					41,333	44,995
Exports, including derivatives					24,584	25,734

(1)Not available. (2)Included with total acid to avoid disclosure of individual company operations.
Source: Based on a special survey conducted by the Chemical and Rubber Division, BDSA.

of phosphorus for this purpose has paralleled closely the growth in synthetic detergents, which have supplanted soaps to a large extent in today's market. This relationship between phosphorus use in all soaps and detergents, compared with syndet production, indicates that the latter consumes greater quantities of phosphorus than do the soaps. If further replacement of soaps by syndets occurs, it should be reflected in comparable growth in the use of phosphorus.

The second largest consumption of phosphorus is in fertilizers and is accounted for largely by the Tennessee Valley Authority's production of concentrated superphosphate, calcium metaphosphate, and other phosphatic materials. The figures in table I indicate a marked increase in this use, too, since 1950. This increase may be somewhat exaggerated because of a possible low reported use for this purpose in 1950 which represents TVA's consumption only. Although fertilizer use of phosphorus from commercial sources was minor in 1950, it is believed that some quantities were so used and are probably included under the category "miscellaneous incl. dealers." During 1954 and 1955 increasing quantities of commercially produced phosphorus in the form of phosphoric acid were distributed for fertilizers, including the enriching of normal superphosphates, recovery of coke oven ammonia as diammonium phosphate, direct application to soil or irrigation water, and the manufacture of soluble or specialty fertilizers.

The proportion of total phosphorus distributed for fertilizers declined from 17.3 percent in 1954 to 15.8 percent in 1955. This decrease was primarily the result of a cutback in TVA's use of phosphorus for fertilizers, since the distribution reported by private producers of phosphorus for fertilizer use increased from 17,000 tons in 1954 to 21,860 tons in 1955 or from 6.5 to 7.8 percent of the total.

The third most important use for phosphorus is in foods and beverages. In the form of phosphoric acid and various phosphates, largely calcium, it enters into baking powders, flour mixes, cereals, cheese, soft drinks, etc. There is little evidence of any defiinte change in this outlet. Tonnagewise, 1954 consumption fell between that reported in 1950 and 1955, but percentagewise the 1950 proportion (12 percent of the

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total) appears high in relation to 6.5 percent in 1954 and 7.4 percent in 1955.

Phosphorus, largely in the form of dicalcium phosphate, is gaining in importance as a mineral supplement for stock and poultry feeds. Proportionately, this use has shown relatively little change in 1950, 1954, and 1955, constituting approximately 6 percent in each year, which implies that tonnage has apparently kept pace with the overall increase in phosphorus use. Animal feed supplements derived from elemental phosphorus must compete with bone meal, defluorinated rock phosphate, and defluorinated superphosphate as well as products made from wet-process phosphoric acid.

Boiler-water compounds and commercial and household water softeners used for water conditioning are substantial consumers of sodium phosphates derived from phosphorus. Quantities of phosphorus reported distributed for water conditioning increased in 1954 and 1955 but not in relation to the overall increased phosphorus usage. Proportion of the total for this purpose decreased from 6.1 percent in 1950 to 4.4 percent in 1954 and 4.2 percent in 1955.

Phosphorus used in the form of phosphoric acid and the various sodium phosphates for metal cleaning and finishing, including degreasing, rust prevention, polishing, and prime coatings increased markedly in 1955 as compared with the 1954 rate. Distribution of phosphorus in this area of use increased from 2.9 percent in 1950 to 3.0 percent in 1954 and 4.2 percent in 1955.

The lesser uses for phosphorus, composed of petroleum production and refining, including additives; pharmaceuticals and drugs, including dentifrices; and plastics and plasticizers, were slightly below 1950 levels in 1954 but showed improvement in 1955. The "miscellaneous" category combines several groups reported as follows:

(1) Sales to dealers for which ultimate end use was not known, (2) direct military, (3) unspecified end use, and (4) distribution for uses reported by an insufficient number of respondents to list quantities separately. Among the latter uses reported were insecticides and other pesticides, flotation agents, dyes, and glass. The "miscellaneous" category constituted slightly over 9 percent of the total distribution each year. The total reported distribution of phosphorus, excluding

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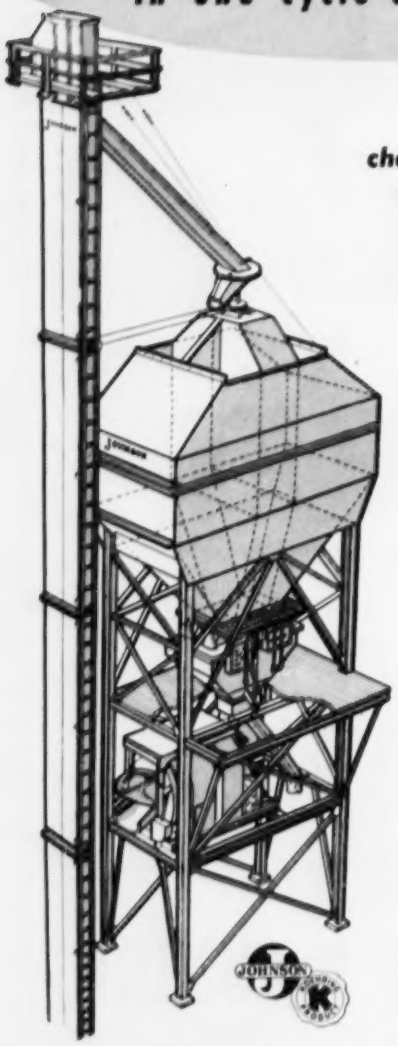

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quantities listed as purchased, was equivalent to 97-98 percent of production in both 1954 and 1955.

Phosphoric Acid

Capacity

Annual capacity for the production of phosphoric acid from phosphorus as of January 1, 1955, was reported to be 771,524 tons P_2O_5, equivalent to 2,131,280 tons 50% H_3PO_4. This capacity theoretically would require 336,800 tons of phosphorus, a quantity approximately 5 percent higher than the phosphorus capacity on that same date. Earlier capacity data for this type of phosphoric acid are not available although, it is known that considerable expansion has taken place in recent years. Other expansions that were completed during 1955, plus those scheduled for completion in 1956 and 1957, are combined with those for the wet-process acid (see below) in order to avoid disclosure of individual company figures.

The same 8 companies that produce phosphorus also manufacture the phosphoric acid, generally at different locations. Nineteen phosphoric acid plants were in operation in 1955 located in the following States: Alabama, 1; California, 3; Illinois, 2; Indiana, 1; Kansas, 1; Massachusetts, 1; Michigan, 1; New Jersey, 3; New York, 1; Ohio, 1; Pennsylvania, 1; South Carolina, 1; and Tennessee, 2. A new establishment in Texas is expected to be completed in 1956.

The January 1, 1955, capacity for wet-process phosphoric acid was reported at 993,210 tons P_2O_5. In terms of 50% H_3PO_4 this would amount to 2,743,674 tons. This capacity represents an increase of 114 percent over that in existence on September 1, 1951[1].

The combined capacity for both types of phosphoric acid totaled 1,764,737 tons P_2O_5, equivalent to 4,874,954 tons 50% H_3PO_4, on January 1, 1955. The reported scheduled expansions for both types of acid will raise capacity to 1,995,477 tons P_2O_5 by the middle of 1957. Since the completion of this survey there have been reports in the trade press of plans for the construction during 1956 of three new wet-process phosphoric acid plants not included in the above statistics. It appears, therefore, that total phosphoric acid capacity will well exceed 2,000,000

[1] *As reported by the U. S. Department of Agriculture, "Survey of the Superphosphate and Wet-Process Phosphoric Acid Industries in the United States in 1950 and 1951."*

tons P_2O_5 by July 1957.

Many of the new as well as old wet-process phosphoric acid plants have coexisting triple superphosphate facilities. Twenty companies were operating 25 wet-process plants in 1955 located in the following States: California, 2; Florida, 7; Idaho, 1; Illinois, 2; Kansas, 1; Missouri, 1; Montana, 1; New Jersey, 1; Pennsylvania, 1; South Carolina, 2; Tennessee, 1; Texas, 4; and Utah, 1. Fourteen of these plants, including all 7 in Florida, have coexisting triple superphosphate facilities and 4 others are essentially fertilizer establishments also, using the acid to produce ammonium phosphates, primarily. The 25 wet-process phosphoric acid plants in 1955 compare with 13 in 1951. Fourteen new plants have come into existence since 1951, 2 of the original 13 have ceased operations.

Production

On the basis of the theoretical conversion factor of phosphorus to phosphoric acid, it appears that approximately 87 percent of the phosphorus produced in 1954 and 1955 was converted to the acid. The production of both types of phosphoric acid (table II) is seen to have been well below capacity in 1955 although showing substantial increases over that of 1954. The acid from phosphorus was produced at about 73 percent and wet-process acid at approximately 79 percent of capacity. The increases in output since 1950 for the two types of acid were 93 and 162 percent, respectively. Thus, the proportion of total phosphoric acid accounted for by the wet-process acid has advanced from approximately 50 percent in 1950 to 58 percent in 1955.

Use Distribution

There are only two producers of wet-process phosphoric acid who report distribution of significant quantities of acid for purposes other than fertilizers and feed supplements. Therefore, the distribution of the wet acid for all uses except fertilizers has been combined in table II with the acid from phosphorus to avoid disclosure of individual company operations.

The wet-process acid is consumed predominantly for fertilizers, which accounted for 79 percent of the total in 1954 and 81 percent in 1955. As a comparison, fertilizer use of acid from phosphorus amounted to 15 and 12 percent, respectively, for the same years. The proportion of the latter type of acid used for fertilizer is significantly less than the in-

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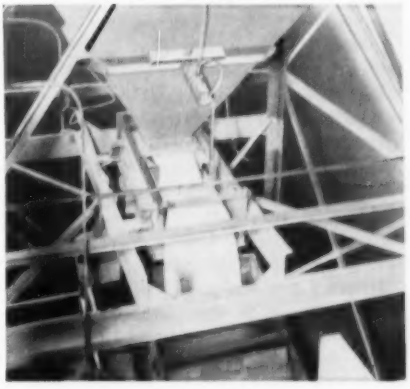

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dicated use of phosphorus. The difference can be attributed to use by TVA of substantial quantities of phosphorus in calcium metaphosphate, which does not involve the intermediate production of phosphoric acid.

Captive consumption for the manufacture of triple superphosphate in coexisting facilities constitutes the major share of distribution of the wet-process acid for fertilizers. However, the production of fertilizer-grade ammonium phosphates, largely involving captive use of wet acid also, has been growing in recent years. In the process of recovering ammonia from coke oven gas as diammonium phosphate, the acid made from phosphorus apparently is preferred by the industry over the wet-process acid because of certain impurities in the latter which cause some difficulty.

The proportionate distribution of the combined phosphoric acids in 1955 was as follows: Fertilizers, 52 percent; soaps, detergents and sanitizers, 28 percent; animal feed supplements, 5 percent; food and beverages, 4 percent; water conditioning, 2 percent; metal cleaning, etc., 2 percent; and miscellaneous, 3 percent. The 1954 breakdown was similar, with fertilizers somewhat lower (50 percent) and soaps, detergents, and sanitizers higher (30 percent) than in 1955. The two use categories, (1) plastics and plasticizers and (2) matches and fire retardants, which were listed for phosphorus, accounted for relatively minor quantities of acid or its derivatives and distribution for these purposes is included under "miscellaneous." Otherwise, the phosphoric acid distribution pattern differs from that for phosphorus principally in that fertilizers replace soaps, detergents, and sanitizers as the number 1 usage and animal feed supplements take over the third position from foods and beverages.

OBITUARIES

Farquhar Campbell, 69, founder of Campbell Fertilizer Co., Houston, Texas, April 13 at his home after a two-year illness.

Joseph C. Long, 43, a superintendent at V-C Chemical, Fort Meade, died April 6 in Lakeland, Florida.

CROP CHEMICALS

Miller Amendment Effective July 22

Raw agricultural commodities which would have been legal in interstate commerce prior to July 22 will not be considered adulterated within the meaning of the Food, Drug and Cosmetic Act even though it is marketed after July 22. This applies to chemicals on which FDA has already granted specific extensions but in terms of the dates to which the extensions have been granted, May 1 and June 15.

AP&C Issues Fumigant Bulletin

An illustrated informational bulletin on Bromofume soil fumigant has been issued by the Agricultural Chemicals Division of American Potash & Chemical Corporation for use in controlling nematodes in the growing of numerous truck and field crops.

The folder includes information on uses for Bromofume, proper soil preparation, methods of application and recommended dosages.

Shell Grasshopper Film Available

County Agents have the opportunity this year to show an interesting film on grasshopper control at farmer meetings and other events with "Exit Grasshoppers," a full-color, 10 minute, 16 mm sound movie. The movie describes grasshoppers, the damage they do and how they are controlled with modern insecticides. Recommended control practices are shown for both crop and range land.

"Exit Grasshoppers" can be obtained from Shell Oil Company, Film Library, 624 South Michigan Boulevard, Chicago 5, Illinois.

Research Pays Off On Pink Bollworm

John White, Texas Agriculture Commissioner, announced that gin sterilization of cottonseed moving within his state is no longer necessary.

This is a direct result of research conducted over the past three years which shows that modern ginning kills all—or almost all—of the pink bollworms in cottonseed. This means an annual cash saving to oil mills of about one-and-a-quarter million dollars.

These are just the first of the payoffs that may be expected from the expanded research program developed by the Council's Beltwide Pink Bollworm Committee, and supported by USDA, cotton growing states, and the cotton industry through the Oscar Johnston Cotton Foundation. Other phases of work show great promise for yielding dividends soon.

N. H. Penalty Levy Determined for 1956

The New Hampshire Department of Agriculture has determined what the rate of penalty per pound of fertilizer content will be in 1956, in any cases where the department finds that content of fertilizer bought by the farmers, or delivered to the farmer, fails to meet the stated content on the bag.

The value of $3 per unit or 15 cents per pound has been determined on nitrogen. On phosphoric acid, it will be $2 per unit or 10 cents per pound. Then on potash, it will be $1.20 per unit or six cents per pound.

The new regulations state that when plant food deficiency is found in a bag or a lot of fertilizer delivered to a farmer, or a deficiency is discovered by inspectors making their usual rounds, then there shall be a penalty assessment against the party responsible, the assessment going to the party found short of material guaranteed on the bag.

Insect Control Recommendations

The official cotton insect control recommendations plus planting cottonseed treatment and defoliation guide has been published by the National Cotton Council.

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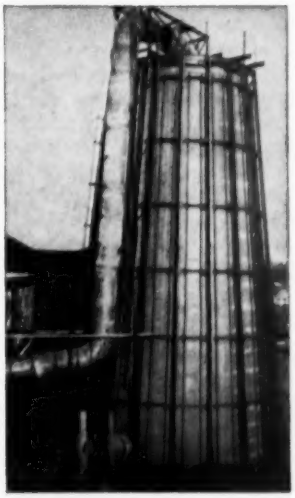

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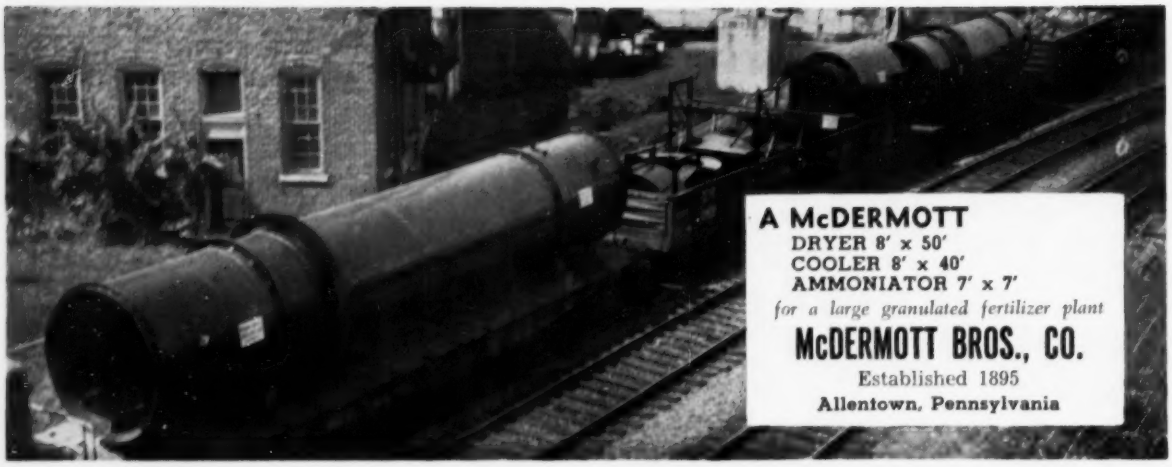

St. Regis Issues Packaging Manuals

Results of research into all phases of multiwall packaging are now available for reference through a series of manuals issued by St. Regis Paper Company. Written by multiwall packaging technical specialists the manuals are designed to aid in cutting costs by solving packaging problems. Handbooks issued thus far include a palletizing manual, a multiwall bag papers manual, and a printing manual.

The palletizing manual represents the best current thinking on how multiwall paper bags are handled as pallet and unit loads. It incorporates publications and material made available by pallet manufacturing associations, fork lift manufacturers, and others in the palletizing field. The manual is designed to aid in cutting bag handling costs and to insure that filled multiwalls arrive at the final destination in the best possible condition.

The multiwall bag papers manual includes a brief history of paper making, together with the methods used in testing, manufacturing and conditioning the various papers used in St. Regis multiwalls.

The printing manual reports on the many methods of printing now being used. Subject material includes types of inks and paper, printing plates, and St. Regis multiwall bag printing.

Each of the manuals is illustrated profusely with charts, photographs, and drawings.

Electronic Control Feature Of New Fords Hammermill

An electronic control is one of the "jet age" features of the new Fords "Remote Control" Industrial Hammermill which is adaptable for grinding and size-reduction of a large variety of industrial materials, including: bone, borax, casein, calcined rock, chemicals, clay, cotton seed, dried fish scraps, meat scraps and oyster shells.

Built right into the new Fords Mill, this electronic unit makes it possible to control the feeding of materials into the mill by the push of a button. This control button can be located inside or outside the mill, or even in another building.

The Fords Mill control makes possible grinding at a uniform constant rate, at exactly the horsepower available. The new mill assures a uniform granular grind through flexibility of the hammer arrangement.

Since it virtually eliminates surges in power, the Fords Electric Control materially reduces over-all electric power costs. Operating time is reduced and the need for drag conveyors for conveying materials is eliminated in most installations.

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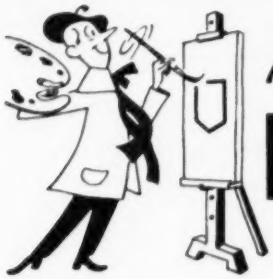

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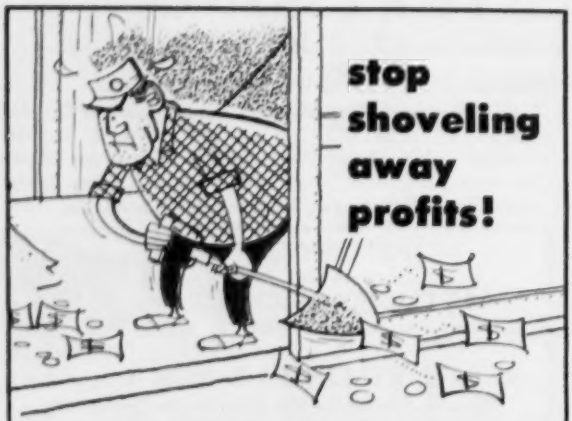

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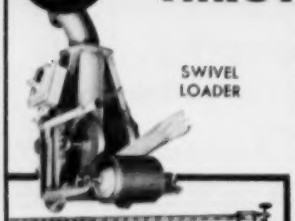

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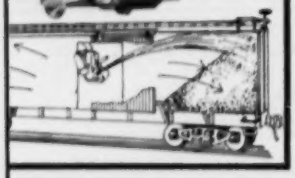

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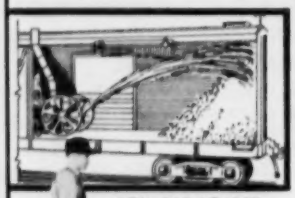

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